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Analysis of *DAT*1 (SLC6A3) RS27072 gene polymorphism, parenting style, and internet addiction tendency in adolescents: A *cross-sectional study*

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Abstract: To determine the relationship between DAT1 (SLC6A3) rs27072 gene polymorphism and parenting style in adolescents with a tendency toward internet addiction. *Cross-sectional* study of 443 adolescents aged 10-19 years. The study identified adolescents with a tendency toward internet addiction using the Internet Addiction Diagnostic Questionnaire (KDAI), with 84 meeting the inclusion criteria and 311 without a tendency. Parenting style was assessed using the Child Parenting Questionnaire (KPAA). The DAT1 (SLC6A3) rs27072 gene polymorphism was examined in 84 adolescents with a tendency toward internet addiction and 39 without, using PCR-RFLP and restriction enzyme methods. Statistical analysis employed *Fisher's exact test* and *chi-square test* to evaluate relationships between variables, with a significance level of $p < 0.05$, and binary logistic regression to predict the probability of an event based on predictor variables. The results indicated that the DAT1 (SLC6A3) rs27072 gene polymorphism is significantly associated with internet addiction tendencies in adolescents, with most exhibiting GG *bands*, while adolescents without such tendencies mostly display TT and TG *bands*. Parenting styles are also significantly associated, with adolescents exhibiting internet addiction tending to have permissive parenting, whereas non-addicted adolescents mostly have democratic parenting styles. The combination of DAT1 (SLC6A3) rs27072 gene polymorphism and parenting style is significantly associated with internet addiction tendencies. Specifically, the G allele of the DAT1 gene and an exposure (permissive) parenting style are linked to a higher likelihood of internet addiction in adolescents.

Keywords: *Adolescents, DAT1(SLC6A3) rs27072, Gene polymorphism, Internet addiction, Parenting style.*

1. Introduction

In the era of globalization, technology, communication, and information continue to develop rapidly, making the internet an inseparable part of modern life. Over time, the need for the internet has increased. Data from the Indonesian Internet Service Providers Association [1] noted that of Indonesia's 272 million population, around 210 million people or 77.02% have been connected to the internet. This figure reflects the high internet penetration in Indonesia, which now exceeds more than half of the population [1].

The large number of internet users has led to the development of problems in society related to excessive uncontrolled internet use or internet addiction. Internet addiction is uncontrolled and compulsive internet use, pleasure with computers or technological devices, inability to control such as its use, poor time management, desires, and interpersonal problems [2]. In the 2022 APJII survey, it was found that internet users in Indonesia based on age were the highest at 99.16% in the 13-18 year age group which is classified as adolescence.

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Adolescence is an important developmental phase such as biological, social, cognitive changes, and excessive internet use can hinder these developments. Several studies have shown that the Internet plays an important role in the learning process, entertainment, and social interaction in adolescents, but excessive or unlimited use can lead to internet addiction [3]. Internet addiction not only reduces their overall well-being [4] but also destroys interpersonal relationships [5] has academic problems [6] and may be an important risk factor for mental disorders such as anxiety and depression [7].

Parenting is *a* normal variation of parental efforts to control and introduce social functions to children including certain behaviors that have an impact on children's behavior individually and cumulatively [8]. Parenting style towards children affect family function. Individuals who have poor family function tend not to get attention, support, and intimate relationships, so that effective social communication style and positive coping mechanisms are not formed, making it easier to seek compensation by using substances or addictive behaviors such as internet addiction, and to relieve the emotions felt, such as feelings of sadness, loneliness, and anxiety [9]. Permissive parenting is associated with the potential risk of developing internet addiction because parents give freedom to use the internet without limits and without supervision. Permissive parents do not set any rules and time limits for internet use. Permissive parents also make mature demands, communicate poorly, and are less nurturing and warm [10]. This makes them more likely to become dependent on others, unable to control their impulses, and unable to face complex situations with confidence. Surfing the Internet can help anxious children find help, reassurance, and support, which ultimately leads to compulsive Internet use [11]. Parents with an authoritarian parenting style have strict rules and high expectations, which can cause significant stress in adolescents and trigger affective and cognitive responses that drive them to seek release through the Internet [12].

The DAT1 gene, also known as *solute carrier family 6 member 3* (SLC6A3), plays a role in encoding the dopamine transporter (DAT) protein. This protein has a major function in regulating dopamine levels in the synaptic gap by returning dopamine into the pre-synaptic neuron through the *reuptake process* [13]. This DAT1 gene polymorphism is able to change the dopaminergic system in the brain which is mostly expressed in the striatum and nucleus accumbens [14]. Research on the relationship between DAT1 gene polymorphisms, especially rs27072, and internet addiction has never been conducted, but there are several studies on DAT1 gene polymorphisms rs27072 in individuals with ADHD (*Attention Deficit and Hyperactivity)*, which are then assumed to also play a role in internet addiction related to the characteristics of internet addiction symptoms that resemble ADHD, namely difficulty focusing and impulsive behavior. DAT1(SLC6A3) gene polymorphism rs27072 especially the G allele can affect the function of this transporter by increasing DAT1 activity through binding to striatal dopamine transporter ligands causing decreased levels of dopamine available in the synaptic cleft, which is found in ADHD [14, 15]. Adolescents who show symptoms of ADHD need special attention because they are at higher risk of internet addiction. There is a reciprocal relationship between ADHD components and internet addiction, indicating that the addition of the internet can increase hyperactivity, lack of focus, and impulsivity in adolescents and weaken their self-control abilities, which in turn leads to more internet-related activities [16]. According to De Nardi, et al. [13] found that there is a correlation between the DAT1 gene in terms of promoter protein function and internet abuse. This is different from other studies that reveal that there is no significant relationship between the DAT1 gene and internet addiction [17].

Given the inconsistent findings, further research is needed to clarify whether the DAT1 gene is related to internet addiction and the role of parenting with internet addiction. On this basis, researchers are interested in conducting research on the analysis of DAT1 (SLC6A3) rs27072 gene polymorphisms, parenting, and the tendency of internet addiction in adolescents. The findings of this research are expected to provide insight for parents in understanding and implementing more effective parenting for children. Meanwhile, children are expected to realize the importance of building communication and maintaining good relationships with their parents. In addition, this research is also expected to contribute to improving parental guidance and preparing a better future for adolescents.

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2. Method

This research adopted a cross-sectional design, where testing and measurement are conducted on a representative population sample using various research instruments. After the data is obtained, statistical analysis is carried out to test and prove the established theory. The population in this research is high school students aged 10-19 years. The sample in this research consists of high school students aged 10-19 years in Makassar City who meet the inclusion and exclusion criteria and have a tendency towards internet addiction.

The sample in this research was obtained through *purposive sampling technique* on high school students in Makassar City who had met the inclusion criteria and were included as research samples.

Inclusion Criteria:

1. Students who tend to be addicted to the internet based on the KDAI questionnaire.
2. Teenage students aged 10-19 years.
3. Can read and write.
4. Willing to participate as a respondent and parental consent.
5. Willing to take blood samples for DAT1 (SLC6A3) rs27072 gene examination in students.

2.1. Exclusion Criteria

1. Suffering from mental disorders and currently taking psychiatric medication.
2. Having a medical disorder (severe physical) limits activity.
3. Have been or are currently diagnosed with drug abuse.
4. Not willing to act as a respondent.

2.2. Drop Out Criteria

- Not willing to continue research
- Die

The number of samples needed for a two-sided test is calculated using the formula proposed by Lemeshow, et al. [18] as follows:

$$n = \frac{(Z_{1-\frac{\alpha}{2}}\sqrt{2\bar{P}(1-\bar{P})} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)})^2}{(P_1-P_2)^2}$$

$$n = \frac{(1.96\sqrt{2(0.375)(1-0.375)} + 1.28\sqrt{0.50(1-0.50)+0.25(1-0.25)})^2}{(0.50-0.25)^2}$$

$$n = 77$$

Based on the calculation results, the minimum number of samples of teenagers with internet addiction was 77 people.

Information :

n= Minimum number of subjects

α = 5% confidence level is 1.96

β = Research power 90%, namely 1.28

P_1 = Proportion of DAT Genotype 9/9 samples with *Attachment Fearful category* 50.0% [19]

P_2 = Proportion of DAT Genotype 9/9 samples with *Attachment Preoccupied category* 25.0% [13]

The type of data used in this research is primary data, data collected directly from the research subjects. The instruments in this research are in the form of informed consent sheets, internet addiction instruments in the form of the Internet Addiction Diagnostic Questionnaire (KDAI) online based on Google Form, parenting instruments in the form of the Child Parenting Questionnaire (KPAA) online based on Google Form, blood sampling kits and DAT1 (SLC6A3) rs27072 Gene examination kits.

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Furthermore, data processing is carried out using SPSS 24.0 and Microsoft Excel software to obtain the expected statistical analysis results.

3. Results and Discussion

3.1. Results

Of the 443 students, 48 met the exclusion criteria, while 395 met the inclusion criteria. Based on the KDAI questionnaire, 84 students had a tendency towards internet addiction, while 311 did not. Examination of the DAT1 (SLC6A3) rs27072 gene was performed on 84 students with a tendency towards internet addiction and 39 students without a tendency towards internet addiction. The characteristics of the study subjects are presented in Table 1.

Table 1.
Distribution of research subjects.

Characteristics		n	%
Age (years)	14	1	0.3
	15	61	15.4
	16	110	27.8
	17	161	40.8
	18	58	14.7
	19	4	1.0
Gender	Man	169	42.8
	Woman	226	57.2
	X	76	19.2
	XI	21	30.7
	XII	198	50.1
Parenting	Democratic	117	29.6
	Authoritarian	45	11.4
	Permissive	210	53.2
	Inconsistent	23	5.8
DAT1 Genotype	GG	50	12.7
	TG	45	11.4
	TT	28	7.1
	Not checked	272	68.9
Amount		395	100.0

Source: Processed Data (2025).

Table 1 presents the characteristics of the subjects of this study, the majority of whom were 17 years old (40.8%), female (57.2%) and in grade XII (50.1%). Most adolescents had exposure parenting style with characteristic C (permissive) of 53.2%, 29.6% had nonexposure parenting style with characteristic A (democratic), 11.4% had exposure parenting style with characteristic B (authoritarian) and 5.8% had exposure parenting style with characteristic D (inconsistent). DAT1 gene polymorphism (SLC6A3) in adolescents with GG *genotype* was 12.7%, TG was 11.4% and TT was 7.1%.

3.2. Results of Parenting Relationship with the Tendency Towards Internet Addiction in Teenagers

Table 2.
Relationship between parenting style and the tendency towards internet addiction.

Parenting	Internet Addiction Tendency	No tendency towards Internet Addiction	*p-value*
	$n = 84$	$n = 311$	
Nonexposure feature A (democratic)	14 (12.0%)	103 (88.0%)	
Exposure to trait B (authoritarian)	8 (17.8%)	37 (82.2%)	0.004*
Exposure feature C (permissive)	59 (28.1%)	151 (71.9%)	
Exposure characteristic D (inconsistent)	3 (13.0%)	20 (87.0%)	

Note: Fisher exact test, *Significant at $p < 0.05$.

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Table 2 shows that there is a significant relationship between parenting style and the tendency of internet addiction (p value <0.05). Most teenagers with a tendency to internet addiction have exposure parenting style with characteristics C (permissive) while teenagers who do not experience a tendency to internet addiction mostly have nonexposure parenting style with characteristics A (democratic). Comparison of the percentage of parenting style based on the tendency of internet addiction is presented in Figure 1.

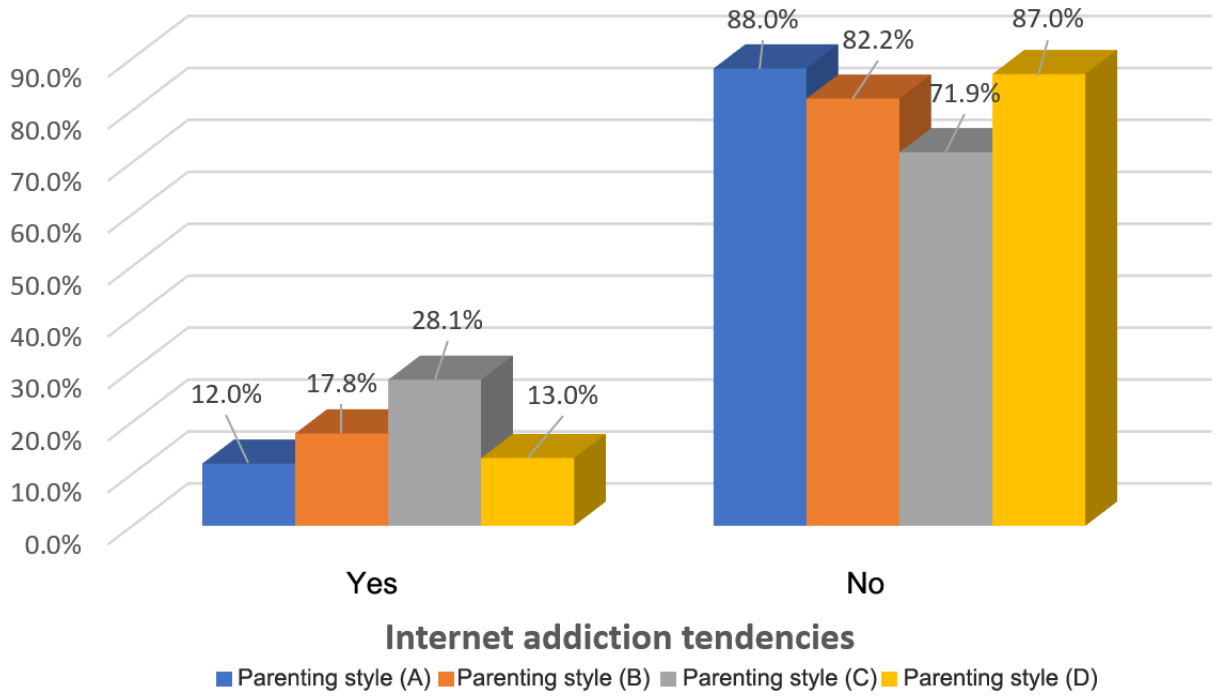

Figure 1.
Results of comparison of percentage of parenting style based on tendency towards internet addiction.

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3.3. Results of the Relationship between DAT1 (SLC6A3) rs27072 Gene Polymorphism and the Tendency Towards Internet Addiction in Adolescents

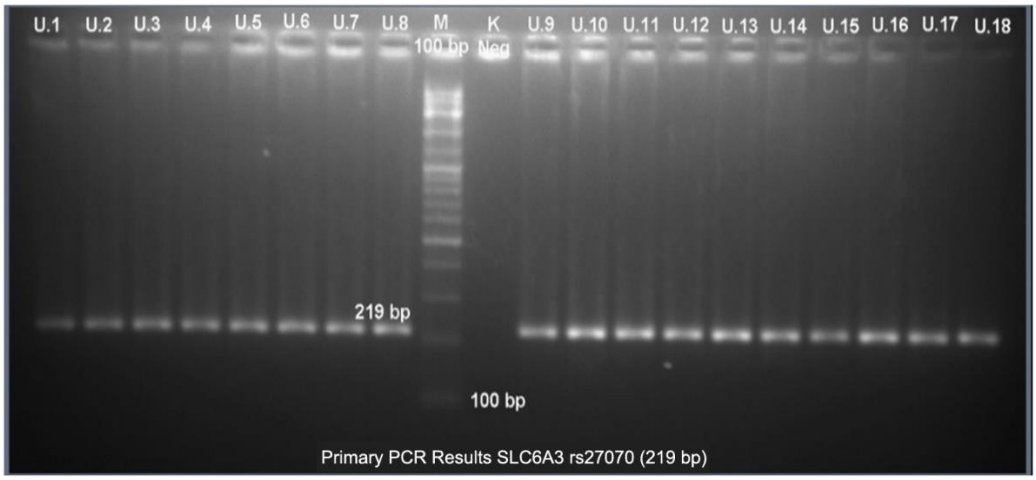

Figure 2.
PCR results of DAT1 (SLC6A3) gene rs27072 (219 bp).

Figure 2 shows the PCR results of the DAT1 gene (SLC6A3) at the rs27072 locus which is seen at 219 *base pairs* (219 bp).

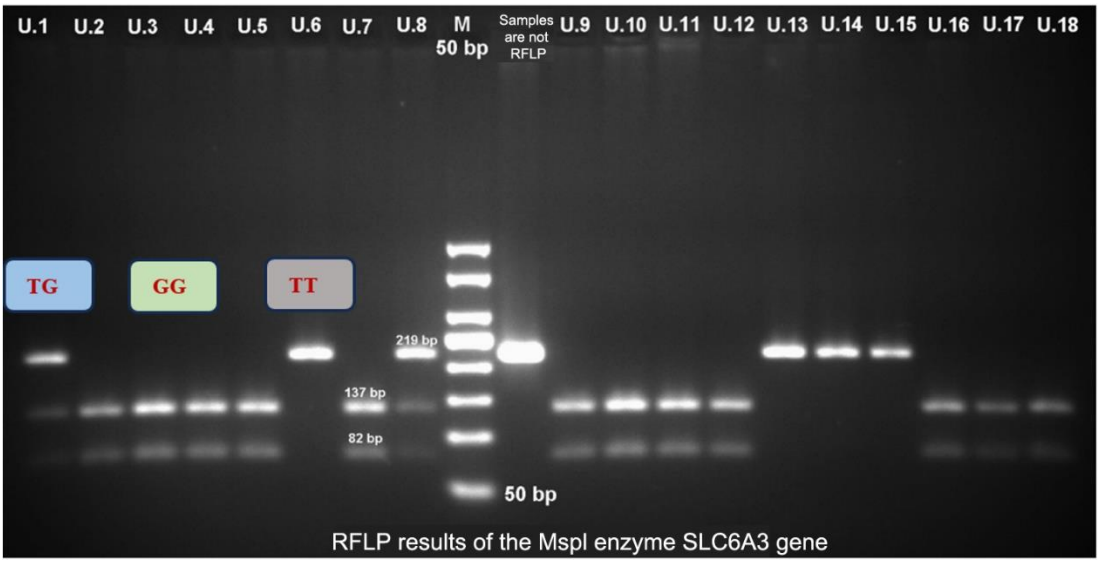

Figure 3.
RFLP Results of the MspI Enzyme of the DAT1 Gene (SLC6A3) rs27072.

The results of this study in Figure 3 show that the DAT1 (SLC6A3) rs27072 gene has three *genotypes*, namely TT, GG, and TG alleles with one, two, or three *bands*. The TT allele genotype has 1 *band* (219 bp), the GG allele has 2 *bands* (137bp + 82bp), and the TG allele has 3 *bands* (137bp + 82bp + 219 bp).

The results of the relationship between the DAT1 (SLC6A3) rs27072 gene polymorphism and internet addiction tendency scores in adolescents are presented in Table 3.

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Table 3.
Relationship between DAT1 (SLC6A3) rs27072 gene polymorphism and tendency towards internet addiction.

DAT1 (SLC6A3) gene polymorphism	Internet addiction tendencies	No Tendency Internet Addiction	*p-value*
	n = 84	*n* = 39	
GG	41 (82.0%)	9 (18.0%)	
TG	30 (66.7%)	15 (33.3%)	0.005*
TT	13 (46.4%)	15 (53.6%)	

Note: Chi square test, *Significant at p < 0.05.

Table 3 shows that there is a significant relationship between DAT1 (SLC6A3) rs27072 gene polymorphism and internet addiction tendency (p value <0.05). Most adolescents with internet addiction tendency have DAT1 gene polymorphism Allele GG at SNP rs27072 while in adolescents who do not experience internet addiction tendency most have DAT1 gene polymorphism Allele TG and TT. Comparison of DAT1 gene polymorphism percentage (SLC6A3) rs27072 based on internet addiction tendency is presented in Figure 4.

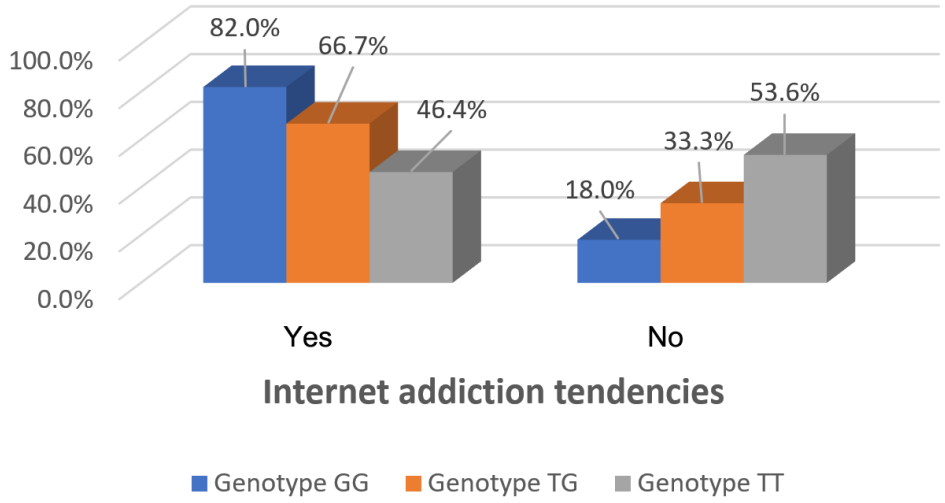

Figure 4.
Results of the comparison of the percentage of DAT1 (SLC6A3) rs27072 gene polymorphism based on the tendency for internet addiction.

3.4. Results of the Relationship between Types of Parenting Style and DAT1 Gene Polymorphism (SLC6A3) with a Tendency Towards Internet Addiction In Adolescents

The relationship between parenting style and DAT1 (SLC6A3) gene polymorphism rs27072 with a tendency towards internet addiction in adolescents were analyzed using multivariate tests, the results of which are presented in Table 4.

Table 4.
Relationship between parenting style and DAT1 (SLC6A3) rs27072 gene polymorphism with the tendency of adolescent internet addiction.

Variables	OR	p-value	CI 95%
Parenting style	8.103	0.000	2.764-23.755
DAT1 (SLC6A3) gene polymorphism	8.394	0.030	1.131-10.992

Binary logistic regression

Table 4 shows that there is a significant relationship between parenting style and DAT1 (SLC6A3) rs27072 gene polymorphism with the tendency of adolescent internet addiction (p value <0.05). The OR value of parenting style is 8.103 while the OR value of DAT1 (SLC6A3) rs27072 gene polymorphism is

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8.394, so the factor that most influences the tendency of adolescent internet addiction is the DAT1 (SLC6A3) rs27072 gene polymorphism. The DAT1 (SLC6A3) rs27072 gene polymorphism GG allele increases the tendency of internet addiction by 8.394 more than the TG and TT allele style.

3.5. Discussion

3.5.1. Parenting Relationship With the Tendency Towards Internet Addiction in Teenagers

The findings of this study show that parenting style are significantly related to the tendency of internet addiction in adolescents. The tendency of internet addiction mostly occurs in parenting style with exposure to characteristics C (permissive) while adolescents who do not have a tendency to internet addiction mostly have parenting style with non-exposure characteristics A (democratic). These results indicate that inappropriate parenting style can cause internet addiction [20]. Permissive parenting is related to the potential risk of developing internet addiction because parents give freedom to use the internet without limits and without supervision [10]. Permissive parents do not set any rules and time limits for internet use. Without any rules or restrictions from parents, children are given full freedom to make their own decisions. As a result, they have difficulty distinguishing between right and wrong behavior, because all actions are based on personal desires. Meanwhile, parents do not have enough control or understanding to assess whether their child's behavior is in line with the norms and values that apply in society [21]. Permissive parents make mature demands, have ineffective communication, and are less nurturing and less warm [10]. Parents do not provide guidance and provide restraint, children's worries will continue to recur, and children will have difficulty stopping anxiety-inducing compulsions and balancing time spent on the Internet. In addition, permissive parenting gives children too much freedom and too little advice and control, resulting in more self-doubt in children. This makes them more likely to become dependent on others, unable to control their impulses, and unable to face complex situations with confidence. A vicious cycle can develop, where anxious children seek help, reassurance, and support from surfing the Internet, which ultimately results in compulsive Internet use [11].

In this study, democratic parenting tends to be a protective factor for adolescent internet addiction tendencies. This can be explained because *non-exposure* (democratic) parenting requires children to grow up as independent and free individuals, but still provides boundaries to control children's behavior. Parents need to be more sensitive to the cues shown by children, such as their interests, desires, and opinions. Instead of imposing their will, parents should create an environment full of love, security, and comfort. The role model given to children must be natural, without coercion. In addition, parents need to encourage children to develop according to their true selves, and provide appreciation for their successes or positive behavior. If a child experiences difficulties or makes mistakes, the right approach is to provide constructive guidance and correction, not threats or punishment [21]. Adolescents who receive adequate parental care and protection are less likely to exhibit internet addiction behavior [22]. Democratic parenting creates a warm relationship with parents. Parenting warmth is referred to as responsiveness or support related to positive affiliation, communication attention, or unconditional love expressed by parents towards children [20]. Democratic parents exercise positive control and provide reasons for disciplining children. Parents set rules for adolescents' internet use. Democratic parenting plays a protective role in preventing adolescents from developing internet addiction [10].

These results are in line with a cross-sectional survey study of 1194 students recruited voluntarily from three universities in China by Guo, et al. [23] that positive parenting, such as emotional warmth, is a protective factor for the development of internet addiction, while negative parenting, such as rejection and overprotection, are potential risk factors for internet addiction. A *cross-sectional study* conducted on 290 adolescents by Sarfika, et al. [24] stated that fathers' authoritarian parenting style and mothers' permissive parenting style were related to internet addiction. In a study by Zulfiqar and Khan [10] conducted on students, it was found that maternal and paternal parenting styles were positively correlated with internet addiction, where parental authoritarianism was the strongest risk factor for internet addiction, followed by parental permissiveness. A *cross-sectional study* of 114 junior

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high school adolescents in Surabaya by Setiawati, et al. [25] found that permissive and authoritarian parenting styles from fathers were positively correlated with the level of internet addiction in adolescents. Paternal permissive parenting significantly predicts the level of internet addiction in adolescents. According to Hasan, et al. [21] the expected parenting type (*non-exposure)* is trait A (democratic), while the unexpected type (*exposure)* is trait B (authoritarian), trait C (permissive), and trait D (inconsistent).

3.5.2. Relationship between DAT1 (SLC6A3) rs27072 Gene Polymorphism and Tendency Towards Internet Addiction in Adolescents

In this study, there is a relationship between the DAT1 (SLC6A3) rs27072 gene polymorphism and the tendency of internet addiction. Research related to the DAT1 (SLC6A3) rs27072 gene polymorphism on the tendency of internet addiction has never been done before but has been reported in general in substance addiction. The results are in line with the research of Ruzilawati, et al. [26] that the SLC6A3 rs27072 gene is associated with drug addiction behavior. In the study of Tzeng, et al. [27] it was reported that the rs27072 polymorphism is associated with amphetamine addiction. These results can be explained that the dopamine transporter (DAT) plays an important role in dopaminergic neurotransmission by actively mediating dopamine reuptake from synapses to presynaptic terminals but also regulates synaptic dopamine concentration and the duration of dopaminergic activity. Therefore, DAT dysfunction plays a role in the pathophysiology of substance addiction [27].

This study found that the DAT1 gene polymorphism (SLC6A3) rs27072 *genotype* GG is associated with a tendency towards internet addiction in adolescents and the GG *genotype* is 8 times more at risk of experiencing a tendency towards internet addiction. Research related to the DAT1 gene polymorphism (SLC6A3) rs27072 especially the GG *genotype* on internet addiction has never been done before but the role of the G allele of rs27072 has been found to be indicated as a risk allele for ADHD [28]. This is associated with common symptoms that appear in individuals with internet addiction resembling the characteristics of ADHD. The G allele of SLC6A3 rs27072 is transmitted excessively to children with ADHD which is characterized by persistence in goal achievement and lower attention. The rs27072 polymorphism in the DAT1(SLC6A3) gene, the G allele, can affect the function of this transporter by increasing DAT1 activity through binding to the striatal dopamine transporter ligand, causing a decrease in the levels of dopamine available in the synaptic cleft, which has been found to be associated with the occurrence of ADHD (*Attention Deficit and Hyperactivity Disorder)* [14, 15]. The characteristics of internet addiction symptoms resemble individuals with ADHD, namely difficulty focusing and impulsive behavior. This is as reported in the study of Wang, et al. [16] that there is a reciprocal relationship between ADHD components and internet addiction, indicating that the addition of the internet can increase hyperactivity, lack of focus, and impulsiveness in adolescents and weaken their self-control abilities, which in turn leads to more internet-related activities.

Similar results have been reported regarding the relationship of the role of the G Allele of the DAT1 (SLC6A3) rs27072 gene polymorphism in addictive behavior. These results are as reported in the study of Pavlova, et al. [29] that carriers of the G Allele of the DAT1 rs27072 SNP, both in heterozygous form were found in individuals with significantly higher BMI. This is because DAT1 VNTR is associated with binge eating behavior indicating that dopamine *reuptake dysregulation* may act as a common pathophysiological mechanism in eating disorders with binge eating behavior and in disorders associated with substance use. Binge eating disorder shares many characteristics with addictive behaviors such as reduced control and persistent use that support the conceptualization of addictive eating behavior [30].

3.5.3. The Relationship between Parenting Styles and DAT1 Gene Polymorphism (SLC6A3) with a Tendency Towards Internet Addiction in Adolescents

The findings from this indicate that parenting style and DAT1 gene polymorphism (SLC6A3) are jointly associated with internet addiction tendencies in adolescents. In a study by Li, et al. [31] it was

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stated that children with variant genotypes or three variant haplotypes of the dopamine transporter gene solute carrier family C6, member 3 (SLC6A3) (single nucleotide polymorphisms in intron8 and intron13, and a 40 base pair variable number tandem repeat [VNTR] in the 3′-untranslated region [UTR]) had the same effortful control regardless of maternal parenting style at 30, 42, and 54 months of age. Nevertheless, this study supports the finding that genotype increases the risk of children experiencing poor adjustment when exposed to an unsupportive environment.

Interactions between the DAT1 gene and parenting have been reported by Watts and McNulty [32] who explored whether variants in the monoamine oxidase A (MAO-A) gene and the dopamine transporter (DAT1) gene interact with parenting to influence self-control and offending. The results revealed that parenting interacted with these genes to influence self-control and offending, and that the parenting-by-gene interaction effect on offending was mediated by self-control. The effects of parenting on self-control and offending were most pronounced for those carrying plasticity alleles for MAO-A and DAT1. Thus, MAO-A and DAT1 amplified the negative effects of parenting on self-control. In Hayden, et al. [33] children were genotyped for DAT1 and participated in a standardized parent-child interaction task with a primary caregiver. Results indicate that the DAT1 9-repeat variant is associated with children's negative affect expressed toward parents during parent-child interactions, and parents of children with the 9-repeat allele show more hostility and lower guidance/involvement than parents of children without the 9-repeat allele. These gene-environment associations are partially mediated by children's negative affect toward parents. The polymorphism is specific for eliciting negative parenting, suggesting that arousing associations play a role in increasing children's risk for emotional trajectories toward risk for psychopathology. DAT1 influences children's negative affect based on dopamine's role in general emotional processing. Decreased central dopaminergic activity results in poor emotion-based decision-making, suggesting that variation in DAT1 may exert its effects on cognition and emotion. DAT1 variants contribute to the extent to which children are impaired in their capacity to develop close attachments to caregivers. Relatively weak dopaminergic-mediated parent-child bonds may, over time, result in parent-child interactions characterized by increased negativity. There are several pathways by which genotypic variation in DAT1 may contribute to childhood externalizing symptoms, although these require further research.

This research specifically analyzes the DAT1 (SLC6A3) rs27072 gene polymorphism in children with a tendency towards internet addiction in adolescents, which is the first research that is an advantage in this research.

4. Conclusion

The results of this study indicate that parenting style and DAT1 (SLC6A3) rs27072 gene polymorphisms have a significant relationship with the tendency of internet addiction in adolescents. Adolescents with permissive parenting style (exposure) tend to be more susceptible to internet addiction compared to adolescents who are raised with democratic parenting style (non-exposure). In addition, DAT1 (SLC6A3) rs27072 gene polymorphism also plays a role in the tendency of internet addiction, where individuals with the GG genotype experience more internet addiction, while the TT and TG genotypes are more dominant in individuals who do not experience this tendency.

Overall, this study revealed that a combination of parenting and genetic factors contribute to the tendency of internet addiction in adolescents, with the DAT1 (SLC6A3) rs27072 gene polymorphism as the most influential factor. These findings indicate that strategies to prevent internet addiction in adolescents need to consider environmental factors, such as more democratic parenting, as well as further understanding of the genetic factors that play a role. Therefore, further research with a larger number of controls is needed to strengthen the scientific evidence regarding this relationship.

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Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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