



# Not only Trolls are Trolling the Internet: A study on dark personality traits, online environment, and commentary styles

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*On the Internet, many commentary styles take place on various forums, and abuse is not uncommon. We investigated the personality traits related to individuals' behaviors on Internet forum posting. The Dark Short Tetrad (SD4) were used to predict (N = 212) three types of commentary styles: Trolling (malicious posting), Lurking (reading/not posting) and Posting (reading/posting). The results showed that Trolling co-varied with Sadism ( $r = .38$ ) and Machiavellianism ( $r = .28$ ). The results also showed that people high on dark traits are Trolling the Internet. Exploratory mediator analyses further revealed that various aspects of anonymity trivially moderate personality traits and behavior (indirect effects  $\beta \approx .10$ ). The overall take-home message is that personality traits, especially dark traits, play a role in how individuals express themselves online. This provides well-needed insight in abusive behaviors in forums on the internet.*

**Keywords:** personality, Dark Tetrad, Internet behavior, online environment

Much of today's communication takes place over the Internet. In 2019, 98 % of the population in a progressive country like Sweden had access to the Internet via a computer, smartphone or tablet (The Internet Foundation, 2019). About 83 % used Internet for social media and this number is still on the rise. More tools are being created that enable social activity online (Flanagin, 2017). These tools are used to communicate with other individuals (in forums or games) but also to retrieve information. The largest social network in Sweden is still Facebook, though Instagram and Snapshots are increasingly popular (The Internet Foundation, 2019). On the Internet, millions, if not billions, of people create online profiles to express their thoughts and emotions by sharing content in commentary fields on various forums, presumably expressing their personalities (Azucar, Marengo, & Settanni, 2018). The comment fields in forums like these are designed to let people discuss or express opinions on just about anything, as well as to provide emotional support and entertainment (Phang, Kankanhalli, & Sabherval, 2009). The drawbacks of this development can be false information, lack of security, risk of crimes and frauds, as well as bullying and victimization (The Internet Foundation, 2019). For researchers, these forums provide opportunities to study behaviors, often in rather anonymous digital environments (Rogers, Smoak, & Liu, 2006). In order to understand individuals' online behavior to a greater extent, we examine to what degree personality traits can predict forum posting styles. In addition, we examine if forum anonymity increases this relationship.

## Internet behaviors

Individuals act differently on the Internet than in a face-to-face interaction (Markey & Wells, 2002). There has been some research on associations between behavior on the Internet and personality traits, traits that may form a key to understanding forum posting styles (Buckels, Trapnell, & Paulhus, 2014; Seigfried-Spellar & Lankford, 2018). Three commentary styles have been suggested to stand out (Buckels et al., 2014; Lai & Chen, 2014; Seigfried-Spellar & Lankford, 2018; Shachaf & Hara, 2010; Zezulka & Seigfried-Spellar, 2016). These are "Trolls" (their motive is to seek attention/revenge and are suggested to have personality traits associated with Sadism, low self-esteem, low conscience, and a low moral compass), "Lurkers" (they visit various forums but refrain from writing messages or comments), and "Posters" (they use forums to reveal personal information that often relates to sex life, sexuality, fantasies, family problems, and personal problems, varying in motives). These and other Internet communication styles are shown to be psychologically linked to personality traits (Kosinski, Bachrach, Kohli, Stillwell, & Graepel, 2013). Studying relevant personality traits is important to gain further understanding of posting-behavior and possibly of abusive behaviors on the Internet.

## Dark personality traits

Paulhus and Williams (2002) published The Dark Triad (DT3) measuring three personality traits as the dark features of an individual's personality. Dark traits can predict what kind of approach and values a person has towards others (Kajonius, Persson, & Jonason, 2015). The first of the three

traits is “Machiavellianism” (Mach), characterized by often having a cynical worldview and by striving for power, money and status; they often are cold and pragmatic, and use false play and manipulation. They can be charming, cunning, strategic, enthusiastic and deficient in morals. The second of these traits is “Narcissism” (Narc), characterized by seeking attention and admiration, by being arrogant and exhibitionistic, and by striving for power and leadership. They often feel superior, dominant and self-righteous. They can be charismatic, productive and inspiring. Thirdly, “Psychopathy” (Psych), characterized by often being cold, and by being manipulative, and impulsive. They often have a low degree of empathy and little feelings of guilt. According to Paulhus and Williams (2002), these traits should be studied as a composite measure, as it may otherwise be difficult to distinguish and clarify their unique contributions, which has been criticized (Persson, 2019; Persson, Kajonius, & Garcia, 2019). Persson (2019) and Persson et al. (2019) show that the construct aspect should be seen as two different constructs, and not be summed up (Paulhus & Williams, 2002).

Studies have also suggested that Sadism should be included in the set of dark traits (Buckels, Jones, & Paulhus, 2013; Chabrol, Van Leeuwen, Rodgers, & Séjourné, 2009; van Geel, Goemans, Toprak, & Vedder, 2016; Paulhus, Buckels, Trapnell, & Jones, in press). Apart from the first three traits, Sadism can predict insensitivity to the suffering of others, and can also predict insensitivity when to “strike back” when threatened (Buckels et al., 2013). Sadism also has shown a unique relation to Internet Trolling (Buckels et al., 2013) and to sexuality (Paulhus et al., 2020). The unique aspect of Sadism is that the individual enjoys the suffering of others. It is therefore seen as justified to include this trait in studies regarding behavior in an Internet environment.

### Internet environment

The anonymity aspect of the online environment is reported to affect the behavior on internet (Seigfried-Spellar & Lankford, 2018). This could be due to de-individuation processes (Demetriou & Silke, 2003), inducing a state where individuals feel anonymous among many people. Postmes and Spear (1998) claim that de-individuation must not necessarily lead to unethical behavior on the Internet. However, de-individuation may lead to online disinhibition effects, meaning that in anonymity, communication is more uninhibited than in a face-to-face communication (Clark-Gordon, Bowman, Goodboy, & Wright, 2019).

Measures of Online Environment (OE) can be described with three subcategories (Ritter, 2014). One is “Acceptability” (relates to the hegemonic culture of the forum. Individuals who score high on OE-acceptability may feel it is okay to express themselves with both prejudice and sexist comments). A second is “Aloneness” (encourages harassment, as the OE is lacking social codes, creating inhibitory effects. Individuals do not feel they need to follow ordinary social norms and can write whatever they want). The third is “Anonymity” (neutralizes status disparities and makes individuals feel invisible while also reducing personal responsibility. Individuals participate in more risky behavior and

treat people any way they want since no one knows who they are).

### The present study

The purpose of this study is to predict forum posting behaviors by personality traits, and in addition to explore whether such relationships are mediated by anonymity in the online environment. We are working from the hypothesis that the individual feels secure in the anonymity and therefore write more comments that may seem malicious from other readers’ points of view. To answer this, we pose two research questions: a) Can individuals’ personality traits predict Internet posting behavior? b) Does online environment have a mediating effect for personality traits and Internet posting-behavior?

## METHOD

### Procedure

The study was performed by an internet survey, advertised on platforms such as Facebook and Discord. In addition, all individuals who received information on the study could send it to whoever they wanted. By completing the survey, which was offered in Swedish and in English, the individuals also had to give their consent to participate. A reminder was sent after two weeks.

### Participants

Out of 220 participants, two individuals did not respond to any questions; one participant only responded to the demographic questions and five participants did not answer any questions regarding Internet behavior. These eight individuals were removed from the study. The study thus included 212 Internet users; they were between 15 to 80 years ( $M = 38.36$  years,  $SD = \pm 13.9$  years). The respondents were primarily Swedish speaking (69 %); 12% was English speaking; the remainder spoke another language (18.5 %). Those who filled out the Swedish version of the survey, were on average nine years older (Swedish:  $M = 41$ ,  $SD = \pm 13.5$ ; English:  $M = 32$ ,  $SD = \pm 12.5$ ). Of the participants, 73% were women. 75% of participants had finished College or University studies. For more details on the sample, see Table A1 in Appendix A.

### Measures

**The Dark Tetrad Scale** (SD4; O’Meara, Davies, & Hammond, 2011). This is a 28-item-questionnaire measuring the dark personality traits Machiavellianism, Narcissism, Psychopathy, and Sadism. A 5-point Likert scale was used: “Absolutely Disagree (1)” to “Absolutely Agree (5)”.

**The Online Environment Scale** (OE; Ritter, 2014). This measure addresses the individual’s online environment by 17 items forming the scales for Acceptability, Aloneness, and Anonymity. A 5-point Likert scale was used: “Absolutely Disagree (1)” to “Absolutely Agree (5)”.

Table 1. Descriptives of the Study Variables

	M	SD	Skewness	Kurtosis	Min – Max Range	Cronbach's Alpha
Machiavellianism (SD4)	19.11	5.03	.10	.23	7 - 35	.76
Narcissism (SD4)	17.46	5.26	.21	-.00	7 - 35	.80
Psychopathy (SD4)	12.14	5.05	1.22	1.19	7 - 30	.82
Sadism (SD4)	13.38	5.38	1.02	.95	7 - 35	.79
Acceptability (OE)	15.60	4.56	.33	-.35	7 - 30	.71
Aloneness (OE)	12.16	4.36	.13	-.73	5 - 23	.72
Anonymity (OE)	8.20	3.18	.88	.52	4 - 20	.69
Trolls	18.52	6.91	2.15	7.11	13 - 58	.89
LurkerS	14.47	2.86	-.74	1.60	4 - 20	.74
PosterS	10.19	2.98	.37	.05	5 - 19	.67

Note:  $N = 212$ .  $M$  = mean;  $SD$  = standard deviation; SD4 = The Short Dark Tetrad; OE = Online Environment. Cronbach's alpha ( $\alpha$ ) coefficient was used for the internal reliability of all the measuring instruments.

**Internet Behavior** (Seigfried-Spellar & Lankford, 2018). This 23-item-questionnaire measures 3 online Internet posting behavior styles, namely for "Trolls", "Lurkers", and "Posters". Two 5-point Likert scales were used, one running from "Absolutely Disagree (1)" to "Absolutely Agree 5" and the other from "Never (1)" to "Always (5)". See Table 1 for Cronbach's alphas.

### Model analysis

A basic data process was done by a visual survey conducted of the 212 participants' response option in IBM SPSS for missing data. Six responses were missing from the sample and were replaced with means. Both the Swedish and the English survey were used. Three auxiliary analyzes were conducted. The first one was done to investigate differences between the English and Swedish surveys (see Table A2 in Appendix A). The second was done to consolidate current commentary styles in an exploratory factor analysis (see Appendix B). The third was done to perform a confirmatory factor analysis of the OE scale to determine the subcategories (see Appendix C).

Spearman's correlation was implemented according to recommendations by Howitt and Cramer (2010), with respect to the posting style of Trolling (skewness 2.15). To identify outliers, a standard analysis of the suitability of the

data was performed. Two outliers ( $> 3SD$ ) were found in the dependent variable Trolls. Since the outliers were found in the dependent variable, and since Trolling in itself is a deviant behavior, the decision was made to use the entire sample. The ground for this decision comes from a recommendation made in Hoaglin and Iglewicz (1987) regarding normal distribution and the use of samples of less than 300 (Field, 2018).

We followed Gignac and Szodorai's (2016) guidelines to correlational sizes, considering .10 to .19 indicating a weak relationship, .20 to .29 a medium relationship, and .30 and above a strong relationship. The results that were significant at a five percent level were considered a rejection of the null hypothesis (Bryman, 2018).

Three linear regression models were performed, one for each posting-behavior (Trolls, Lurkers, & Posters), with personality traits (SD4) as independent variables. No multicollinearity was detected (Tolerance: Machiavellianism = .71, Narcissism = .77, Psychopathy = .60, Sadism = .53).

In addition, exploratory mediator analyses were performed with personality traits (SD4) as independent variables and each of the internet posting behaviors as dependent variables, mediated by online environment (Anonymity, Aloneness, and Acceptability). These were conducted with the help of structural equation modeling (SEM) in SPSS AMOS v.23 and with PROCESS in SPSS.

Table 2. Spearman's correlation matrix of study variables

	1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	—											
2. Age	-.20**	—										
3. Education	-.05	.04	—									
4. Machiavelli	.17*	-.11	.03	—								
5. Narcissism	.22**	-.13	.06	.36***	—							
6. Psychopathy	.37***	-.15*	-.09	.24***	.40***	—						
7. Sadism	.47***	-.31***	-.07	.41***	.31***	.56***	—					
8. Acceptability	.20**	-.29***	-.13	.26***	.25***	.39***	.40***	—				
9. Anonymity	.23***	-.14*	-.07	.24***	.15*	.30***	.39***	.51***	—			
10. Aloneness	.25***	-.30***	-.06	.27***	.17*	.32***	.39***	.62***	.51***	—		
11. Trolls	.27***	-.24***	-.04	.42***	.17*	.32***	.54***	.35***	.28***	.36***	—	
12. Lurkers	.13	-.22**	.12	.17*	.08	-.05	.11	.20**	.10	.21**	.33***	—
13. Posters	.17*	-.04	-.08	.13	.11	.30***	.23***	.43***	.20**	.30***	.30***	.26***

Note: Coding: Gender (0 = female, 1 = male); Education (1 = compulsory school/high school, 2 = college/university/other). Dependent variables are Trolls, Lurkers and Posters. Machiavelli = Machiavellianism.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 3. Regression models predicting three internet forum posting behavior styles

	Trolling		Lurking		Posting	
	Beta ( $\beta$ )	<i>p</i>	Beta ( $\beta$ )	<i>p</i>	Beta ( $\beta$ )	<i>p</i>
Gender	.01	.89	.11	.16	.02	.76
Age	-.05	.44	-.15	.04	.12	.08
Education	.00	.96	.13	.06	-.02	.74
Acceptability (OE)	.05	.54	.13	.16	<b>.41</b>	<b>.00</b>
Anonymity (OE)	-.00	.95	-.09	.25	-.13	.10
Aloneness (OE)	.02	.77	.15	.10	.09	.26
Machiavellianism (SD4)	<b>.28</b>	<b>.00</b>	.16	.04	.03	.68
Narcissism (SD4)	-.06	.29	.00	.96	-.08	.24
Psychopathy (SD4)	.09	.19	-.17	.05	<b>.22</b>	<b>.01</b>
Sadism (SD4)	<b>.41</b>	<b>.00</b>	.01	.94	.00	.96
<i>Intercept</i>	1.28	.20	8.78	.00	3.22	.00
<i>R</i> <sup>2</sup>	.45 (.42)		.16 (.12)		.25 (.22)	
<i>F</i>	14.08		2.81		3.15	

Note.  $\beta$  = standardized beta coefficients, *p* = significance value. Numbers in parentheses are adjusted *R*<sup>2</sup>. Figures marked in bold are the significant correlations.

## RESULTS

The matrix with correlations between the study variables is provided in Table 2. The results showed that particularly Trolling had significant correlations with all four personality traits in SD4. Lurkers showed significant correlations with Machiavellianism and Posters with Psychopathy and Sadism.

In the three regression analyses, one for each online forum behavior style (see Table 3), particularly two dark personality traits markedly related to posting behaviors. Sadism co-varied strongly with Trolling, and Machiavellianism co-varied on a medium level. Psychopathy co-varied on a medium level with Posters. All four dark personality traits, all three Online Environment variables, and the demography indicators (gender, age, and education), could explain the variance in Trolling at 45%, Lurking 16%, and Posting 25%, respectively.

## Exploratory mediator analyses with online environment

Exploratory mediator analyses were conducted to further understand the association between personality traits and posting behaviors. The three online environment mediators (Acceptability, Anonymity, & Aloneness) were tested in turn. The indirect effect should exceed  $\beta = .10$ , otherwise it was considered trivial (Gignac & Szodorai, 2016). Most models showed no indirect effect exceeding  $\beta = .10$ . The one exception was found between the Psychopathy-trait and Posting via Acceptability ( $\beta = .13$ ). Figure 1 shows the mediator analysis and the standardized path coefficients.

## DISCUSSION

The goal of this study was to investigate if individuals' personality traits (The Dark Tetrad; SD4) could predict Internet

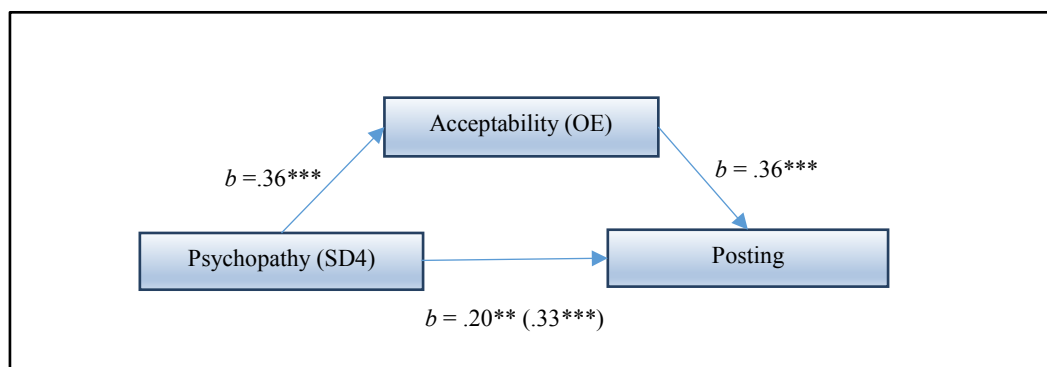


Figure 1. Mediator Analysis between Psychopathy and forum Posting with Online Environment (OE). \*\*  $p < .01$ , \*\*\*  $p < .001$ . *b* = standardized beta. The model shows standardized beta coefficients. The value in parenthesis shows the beta coefficient before the mediator was included in the model.

forum posting behaviors, and whether this prediction is influenced by being anonymous (as measured by the pertaining OE scale). The results showed that particularly Trolling (malicious posting) had significant correlations with almost all four dark personality traits. Controlling for dark personality traits, Sadism and Machiavellianism remained as the strongest predictors for Trolling. This is in line with Buckels et al.'s (2014) results that also showed a strong correlation with the Internet behavior style, and it provides more evidence of the importance of the role of especially dark personality traits. Not surprisingly, it seems that hard-minded people post more malicious content. Similarly, two of the dark personality traits, Sadism and Psychopathy, co-varied strongly with Posting (regular reading and posting on forums). Interestingly, it seems that hard-minded people also post more in conventional styles. This goes somewhat against Buckels et al.'s (2014) results that did not show any relation between Sadism and Posting.

When the Online Environment was investigated as a mediator in these relationships, only trivial effects were found. This means that personality behind posting behaviors generally cannot be explained by how people see or feel or perceive their online environment on Internet forums. The one exception was Acceptability, which describes tolerance to harmful and socially unacceptable behavior on the Internet (Ritter, 2014), which had a small mediating effect explaining Psychopathy and conventional Posting.

This study makes several contributions to research on individual behavior on the Internet. First, this study shows that an individual's behavior on the Internet can be predicted by dark personality traits. The fact that Trolling is related to the dark traits is already known, but what is of interest is that these dark traits (especially Sadism and Psychopathy) are also represented in the regular Posters. Second, the present study also shows in an exploratory way that Online Environment cannot explain the relationship between the dark traits and the posting behavior. It seems that personality traits are "all it takes" for Internet commentary styles.

Some of the concerns of the present study regarding generalizability are the large age range of the respondents (from 15 to 80 years), their geographical distribution (they come from all over the world), and the differences in level of education. Similarly, effects of self-selection bias in the study warrant further caution with respect to what can be concluded (See Simons, Shoda, & Lindsay, 2017). This generalizability issue needs to be further investigated. Also, self-descriptive questionnaires are known for method-variance and for being subject to self-delusion. With respect to the latter, for instance, if a Poster writes a comment that others could see as harassment, while the Poster believes it is an honest and humble opinion, who is correct? Are these posts really a manifestation of psychopathy then?

A limitation may be that in this study only self-evaluations of the individuals' Internet behavior style were used to determine posting styles. In future studies the reader's personality could also be assessed, as Trolling may lie to a great degree in the eye of the beholder (cf. Rauthmann, 2012).

A practical aspect of the present study is that forum posting, and research on forum posting, could be done through chatting in real time. Some studies suggest that persons high on dark traits do not lack the ability to behave themselves, they are just not inclined to do so (Kajonius & Björkman,

2020). Chats are more expedient and could lower the inclination for certain personality types to be malicious. It could of course also enhance certain personality types. Another suggestion for future research in relation to trolling is personality studies with pure "Gamers" (main reason to be online is to play games) versus pure "Netters" (Internet users whose main reason to be online is something other than gaming). It seems, nevertheless, reasonable to assume that people high on dark traits are Trolling the Internet, no matter what the commentary style is called.

## ACCOUNTS AND ACKNOWLEDGMENT

The work on this article was supported by Grant 2014/14/M/HS6/00919 from the National Science Centre, Poland.

Thanks to the department of psychology at the University West, Trollhättan, Sweden for making this study possible. Thanks to Professor Anna Dåderman for kindly helping in early phases of the project.

## Authors contribution

Both authors contributed to the study conception and design. Material preparation and data collection and the analysis were performed by Petri Kajonius and Anna Karlsson. The first draft of the manuscript was written by Anna Karlsson in Swedish and Petri Kajonius wrote the English version. Both authors commented on previous versions of the manuscript, and read and approved the final manuscript.

## Ethical considerations

The guidelines for ethical considerations were implemented, based on the Swedish Research Council's research practice (The Swedish Research Council, 2017).

## Conflict of interest

Both authors declare to have no conflicts of interest

## Data

The dataset generated and/or analyzed during the current study will be available from the corresponding author on reasonable request.

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Received December 16, 2020

Accepted December 22, 2020

## APPENDIX A: Swedish and English surveys

Table A1. Differences in Swedish and English questionnaires respectively

Background variables	Swedish survey		English survey	
	<i>n</i>	%	<i>n</i>	%
<b>Gender</b>				
Man	24	16	32	53
Woman	128	84	27	45
Transgender	-	-	1	0.5
<b>Mother tongue</b>				
Swedish	137	90	9	15
English	-	-	26	43
All other languages	14	9	25	42
<b>Employment</b>				
Student	43	28	18	30
Working	79	52	25	41.5
Unemployed	8	5	7	11.5
Senior	8	5	1	2
Other	14	9	9	15
<b>Form of living</b>				
With parent / parents	6	4	19	32
Single	30	20	12	20
Married / with partner	103	68	21	35
Student home / collectiv	2	1	3	5
Living apart	6	4	1	1.5
Other	5	3	4	6.5

Note. *N* = 212 of which *n* = 152 answered the Swedish questionnaire and *n* = 60 the English.

Among the background questions, some differences were found between the two questionnaires. More of those who answered the English survey lived at home with a parent or caregiver (Swedish survey 4 %, English survey 32 %). In the Swedish survey, more individuals lived with someone else as married or cohabiting (the Swedish survey 68 %, the English survey 35 %). There was also a big difference among the sexes of which in the Swedish survey only 16 % were men while in the English survey 53 % were men. Nine Swedes piloted the English survey and these answers were included in the English study. To find out whether there were any differences between the two studies regarding internet roles, independent *t*-tests and significance tests were made.

The differences found among the *t*-tests have a probable explanation in the sample characteristics. In the English survey, most participants were men (53 %), in contrast to the Swedish survey (16 %); also, the mean age was lower in the English ( $M = 32$ ,  $SD = \pm 12.5$ ), compared to the Swedish ( $M = 41$ ,  $SD = \pm 13.5$ ).

Table A2. T-test between the Swedish and the English survey

SCALES	Swedish ( <i>N</i> =152)		English ( <i>N</i> =60)		t-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
DT4 – "The Dark Tetrad"						
Machiavellianism	18.3	4.7	21.3	5.2	t(210) = -4.01	.689
Narcissism	17.2	4.9	18.1	6.0	t(210) = -1.19	.143
Psychopathy	11.0	4.0	15.0	6.2	t(78.65) = -4.62	<b>.000</b>
Sadism	12.0	4.4	16.9	6.0	t(84.98) = -5.68	<b>.001</b>
OE-scale – "Online Environment Scale"						
Acceptability	14.3	3.8	18.9	4.8	t(89.3) = -6.72	<b>.016</b>
Anonymity	7.6	2.9	9.7	3.3	t(210) = -4.53	.095
Aloneness	11.4	4.1	14.0	4.5	t(210) = -3.99	.638
Internet Posting Behavior Style						
Trolls	17.2	5.1	21.9	9.3	t(73.5) = -3.70	<b>.000</b>
Lurkers	14.4	3.0	14.8	2.5	t(210) = -0.89	.183
Posters	9.7	2.8	11.5	3.1	t(210) = -4.12	.212

Note: Acceptability, Psychopathy, Sadism and Trolls showed differences between the Swedish and the English survey, marked in bold.



**APPENDIX B: Factor analysis of the Internet roles**

When a scale coding for the Yik Yak A, B and C scales (Seigfreid-Spellar & Lankford, 2018) was missing, an exploratory strategy was adopted through a factor analysis according to Dăderman's (2019) recommendations. An explorative principal axis component analysis with varimax rotation was performed in SPSS on 22 (initially 23) questions and statements. The sample consisted of 212 individuals between the ages of 15 and 80 years ( $M = 38.36$  years,  $SD = \pm 13.9$  years); 73 % were women. Principal axis factor analysis was used for the purpose of estimating the number of factors. Before the factor analyses, standard analyses for the suitability of the test of the data material were performed. In their study, Seigfried-Spellar and Lankford (2018) had four Internet roles (Trolls, Lurkers, Confessors, and Posters). Despite several attempts, the results did not follow Seigfried-Spellar and Lankford's theory of four roles. Instead, the present study yielded results on three factors that retained the majority of the items. One statement ("If I am upset with a friend / partner / colleague / teacher, I write something negative about them.") was removed from the factor analysis as it had three low loadings (see Table B1).

The three factors accounted for 50% of the items of a principal component analysis with varimax rotation. Because the sample was suitable for factor analyses, Kaiser-Meyer-Olkin (KMO), measuring sample adequacy, showed .81, which indicates suitability for factor analysis (Hutcheson & Sofroniou, 1999). Bartlett's test of sphericity showed a significance of  $p < .001$ . According to Field (2018), RMSEA should be as close as possible to 0 and CFI as close as possible to 1. The best result the present study obtained in this measurement was with this three-factor analysis: RMSEA .127 and CFI .670.

The three factors were then tested in AMOS (see Figure B1). The figure shows the level of charges between the various questions and statements that were included, as well as the three factors. The highest loading was .88 and the lowest was .35. At a minimum, a loading should be .30 (Field, 2018).

Table B1. The loadings in a factor analysis of the YikYak scales (Seigfried-Spellar & Lankford, 2018)

Question / Statement	Trolls	Lurkers	Posters
YYB.2 I enjoy reading offensive comments for the fun of it.	.82		
YYC.3 How much do you enjoy reading offensive comments?	.81		
YYC.10 How much do you enjoy reading racist or sexist comments?	.79		
YYB.4 I enjoy reading sexual comments for the fun of it	.67		
YYB.1 I enjoy posting offensive comments for the fun of it.	.65		
YYB.6 I enjoy reading negative comments about people.	.65		
YYC.7 How much do you enjoy reading comments that upset people?	.62		
YYB.3 I enjoy posting sexual comments for the shock value.	.61		
YYC.8 How often have you posted a comment that might be considered racist or sexist, according to yourself?	.58		
YYC.6 How much do you enjoy posting comments just to upset people?	.57		
YYB.7 There are comments that are offensive but they are really harmless.	.53		
YYC.2 How much do you enjoy posting offensive comments?	.53		
YYC.9 How often have you posted a comment that might be considered racist or sexist according to others?	.51		
YYA.5 I enjoy reading other people's comments.		.73	
YYC.5 How much do you enjoy reading others debate issues?		.73	
YYC.1 How much do you enjoy reading other people's comments?		.73	
YYA.1 I spend more time reading other people's comments than posting my own.		.69	
YYA.2 I post comments all the time.			.75
YYA.4 I enjoy replying to other people's comments.			.70
YYC.4 How much do you enjoy debating issues?			.61
YYA.3 I have never posted a comment.			-.54
YYC.11 How frequently do you use social media as a way to confess things that you wouldn't publicly talk about?			.45
YYB.5 When I am upset at a particular individual such as friend, significant other, colleague, or professor, I enjoy posting negative comments about them on social media.	.17	-.01	.19

Note: Every item from the three Yik Yak Scales are represented here, along with the loadings.

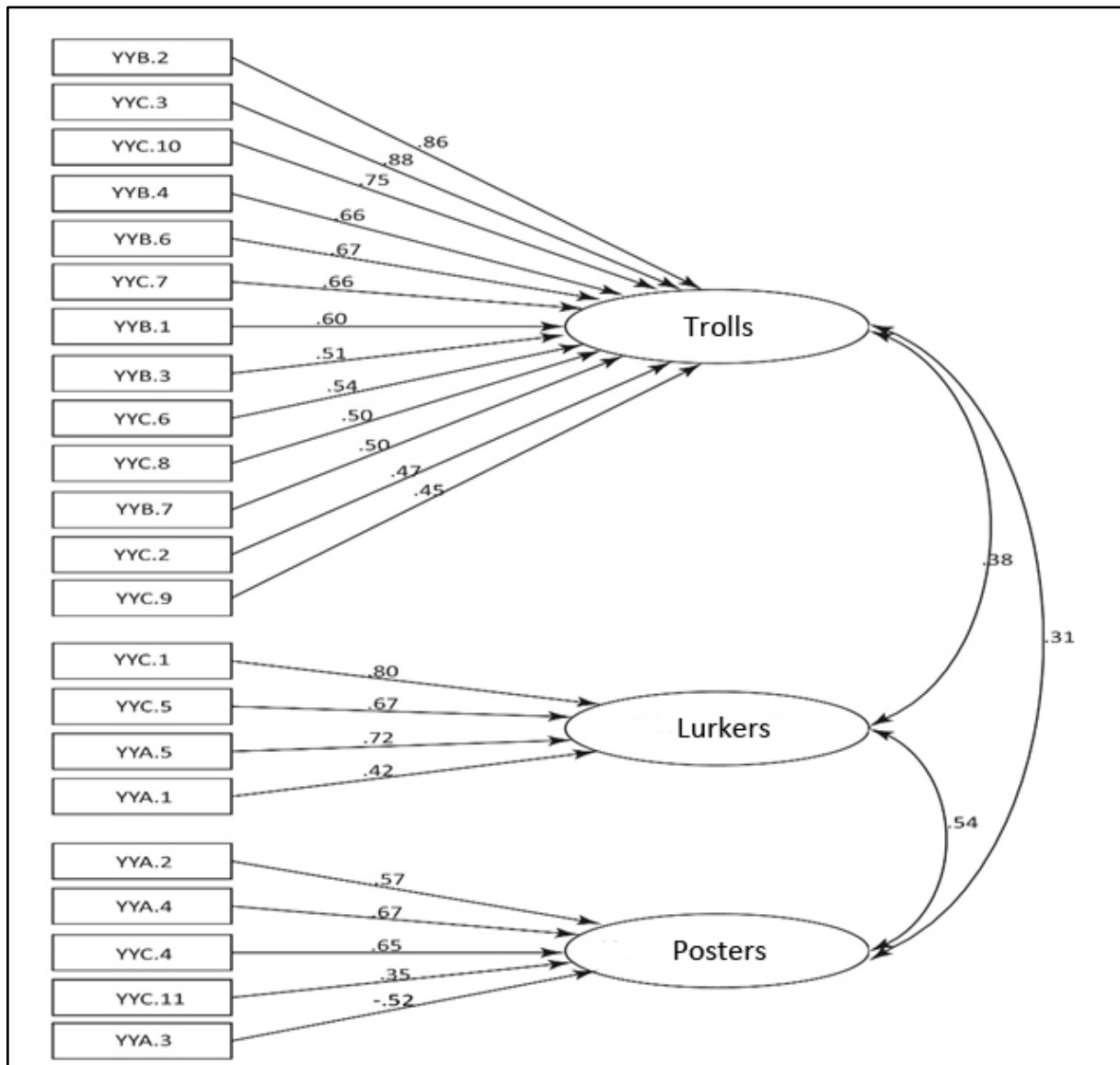


Figure B1. Factor analysis in AMOS. The model shows standardized beta coefficients. Abbreviations: YYA, YYB, and YYC with the numbers refer to the codes of the Yik Yak scales

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**APPENDIX C: Confirmatory factor analysis of the OE scale**

There were some differences between Ritter's (2014) subcategories and Seigfried-Spellar and Lankford's (2018) subcategories in the Online Environment scale (Ritter, 2014). Ritter created the OE item, to which Seigfried-Spellar and Lankford added three items. Another difference was that Ritter had four subcategories, while Seigfried-Spellar and Lankford only collected data on three.

At the time of the survey's advertisement the subcategories had been based on Seigfried-Spellar and Lankford's (2018) results on three subcategories, as well as on the number of questions each subcategory then had. There were questions that were difficult to translate into Swedish, and there were superfluous questions within a specific subcategory. Because of this, three questions were removed. Table C1 lists all items that have been included in the three different studies, together with the subcategories they belong to after a confirmatory factor analysis.

Table C1. All statements included in the three different studies

Ritter (2014)	Seigfried-Spellar & Lankford, 2018	Current study
<b>Acceptability</b>		
It is safe to express prejudice against others online.	It is safe to express prejudice against others online.	It is safe to express prejudice against others online.
It is acceptable to use stereotypes on the Internet.	It is acceptable to use stereotypes on the Internet.	It is acceptable to use stereotypes on the Internet.
It is safe to express prejudice against women online.	It is safe to express prejudice against women online.	It is safe to express prejudice against women online.
	I feel good when I can express what I really feel on the internet.	I feel good when I can express what I really feel on the internet.
Blatant sexism, not acceptable in traditional settings, is allowed online.	Blatant sexism, not acceptable in traditional settings, is allowed online.	Blatant sexism, not acceptable in traditional settings, is allowed online.
	It feels safe to talk about things on the internet that I wouldn't talk about in real life.	It feels safe to talk about things on the internet that I wouldn't talk about in real life.
		I can allow my true personality characteristics to emerge online.
<b>Anonymity</b>		
There is little personal accountability for one's actions online.	There is little personal accountability for one's actions online.	There is little personal accountability for one's actions online.
There are little or no consequences for online behavior.	There are little or no consequences for online behavior.	There are little or no consequences for online behavior.
	I can engage in behavior seen as risky in the outside world when I am online.	I can engage in behavior seen as risky in the outside world when I am online.
There are no repercussions for my behavior online.	There are no repercussions for my behavior online.	There are no repercussions for my behavior online.
	I can treat people however I want on the Internet because they don't know who I really am.	I can treat people however I want on the Internet because they don't know who I really am.
	I can allow my true personality characteristics to emerge online.	
	It is acceptable to demonstrate anti-minority behavior online. *	
	It is acceptable to use stereotypes on the Internet. *	
<b>Aloneness</b>		
There are different norms for behavior online versus face-to-face.	There are different norms for behavior online versus face-to-face.	There are different norms for behavior online versus face-to-face.

*Table C1 continues next page*

Table C1 continued

I have to choose my words more carefully in a face-to-face situation than I do online.	I have to choose my words more carefully in a face-to-face situation than I do online.	I have to choose my words more carefully in a face-to-face situation than I do online.
There is a higher standard for face-to-face behavior relative to online behavior.	There is a higher standard for face-to-face behavior relative to online behavior.*	
	I can say what I want on the internet because it is easy to get out of the situation.	I can say what I want on the internet because it is easy to get out of the situation.
	There is something exhilarating about sharing views online that I could not openly express face-to-face.	There is something exhilarating about sharing views online that I could not openly express face-to-face.
	I have to weigh my word in a face-to-face situation more than when I'm on the internet.	I have to weigh my word in a face-to-face situation more than when I'm on the internet.
	It is easy to act however you want on the internet because others are not physically present.	It is easy to act however you want on the internet because others are not physically present.
Affective Stimulation		
I have support from others online no matter what I say.**	Moved to Acceptability	After confirmatory factor analysis confirmed as Acceptability
I can allow my true personality characteristics to emerge online.**	Moved to Anonymity	After confirmatory factor analysis moved to Acceptability
I can engage in behavior seen as risky in the outside world when I am online.**	Moved to Anonymity	After confirmatory factor analysis confirmed as Anonymity
There is something exhilarating about sharing views online that I could not openly express face-to-face.**	Moved to Aloneness	After confirmatory factor analysis confirmed as Aloneness
I feel good when I express how I really feel online.**	Moved to Acceptability	After confirmatory factor analysis confirmed as Acceptability
It is easy to act however I want online because other people are not physically present.**	Moved to Acceptability	After confirmatory factor analysis confirmed as Aloneness

Note. \* = statement that was excluded in the Swedish study. \*\* = Items moved to a subcategory other than the original.

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