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STRESS AS A MEDIATOR BETWEEN RISK AND PROTECTIVE FACTORS AND ONLINE RISKY BEHAVIORS IN ADOLESCENTS

The aim of the study was to examine the mediating role of stress in associations between online risky behaviors and real-life risky behaviors and information security awareness as risk factors, and life satisfaction as a protective factor. Participants were university students (N = 883, 40.5% male, and 59.5% female) with an average age of M = 21.93 years (SD = 4.29). They filled out the Users' Information Security Awareness Questionnaire, Youth self-reported delinquency and risk behaviors questionnaire, Life satisfaction scale and Perceived Stress Scale. Mediation analysis revealed a significant mediating role of stress in associations between online risky behaviors and real-life risky behaviors and life satisfaction. For the association between real-life risky behaviors and online risky behaviors stress had only a partially mediating role. However, stress had a fully mediating role in the association between life satisfaction and online risky behaviors. Overall results indicate that stress can be seen as underlying mechanism in association's between real-life and online risky behaviors in adolescents. Under stressed conditions, adolescents choose to focus on negative outcomes more frequently because they refocus their cognitive resources on emotion regulation and leave inhibitory processes necessary to prevent risky behaviors uncontrolled.

Keywords: stress, online risky behaviors, real-life risky behaviors, life satisfaction, information security awareness

Introduction

Online Risky Behaviors as a Type of Adolescent Risky Behaviors

According to previous study (Adams & Berzonsky, 2003), adolescence has been viewed as a critical developmental period and, also, as the period of greatest risk for engagement in problematic behaviors (Eaton et al., 2012) such as alcohol, cannabis, and drug use, smoking, aggression, minor delinquency, risky sexual behaviors and unsafe driving (Duell et al., 2018). In late adolescence (from 18 to 24 years of age), which is a period of frequent change and exploration of life goals and roles, young people seek to gain economic and psychological autonomy, become more responsible and step into adulthood (Sawyer et al., 2018). In this process risky behaviors become more frequent and reach peak during late adolescence (Duell et al., 2018). However, adolescents' engagement in risky behaviors is usually temporary and depending on their age, social context and social roles (Derefinko et al., 2016). As they enter the legal age, young people become more aware of social and legal consequences of their risky behaviors.

In the recent decades, information and communication technologies (ICTs), especially smartphones and the Internet, have become a part of everyday adolescent life. With the new technologies, young people can satisfy their primary emotional and communicative needs in the safety of online environment (Dolev-Cohen & Barak, 2013; Valkenburg & Peter, 2011). However, digital environment has become a "safe place" for manifestation of adolescents' risky behaviors, especially when they reach legal age. Young people in late adolescence make a transition from real-life risky to online risky behaviors, such as revealing too much personal information (O'Keeffe & Clarke-Pearson, 2011), sharing sexual content with strangers (Baumgartner et al., 2010), sharing content with potentially negative impact on a person's career (Pujazon-Zazik & Park, 2010), texting with strangers and meeting them in real life, cyberbullying or visiting unsecured sites (Dowell et al., 2009). Adolescents are even more encouraged to engage in online risky behaviors since there basically are no legal and social consequences most of the time. Most online activities can be anonymous, they are not firmly monitored as real-life behaviors, and there are still lots of legally unregulated areas when it comes to engagement in online risky behaviors. Hence, online risky behaviors can be considered as another specific type of risky behaviors in adolescence. More importantly, engaging in online risky behaviors is more likely in late adolescence than in any other age group (Escobar-Chaves & Anderson, 2008).

Information and communication technologies bring adolescents a significant amount of opportunities and diversities in their lives. There is no wonder that those technologies became a substantial part of adolescents' lives. However, in addition to the positive sides, these technologies also have a dark side if used for the wrong purposes. Online risky behavior may result in severe con-

sequences, such as mental health difficulties and some cases, suicide (Kowalski & Limber, 2013).

Stress as a Trigger for Risky Behaviors in Adolescents

Traditionally, adolescence is viewed as a period of life associated with highest levels of stress (e.g., Spear, 2000), which are caused by developmental tasks that young people face in the transition from childhood to adulthood (Blakemore, 2008). Krapić et al. (2015) pointed at certain developmental changes that can have stressful effect on adolescents, such as sexual changes related to puberty, school life demands, problems with initiating and maintaining friendships and romantic relationships, career choice, beginnings of working life, gaining independence from families, adaptation to cultural expectations of becoming an adult. In this period some adolescents also have to face unusual stressors such as mental or physical illness, drug or alcohol abuse, parental divorce, poverty, violence, teenage pregnancy, abuse, etc. (Krapić et al., 2015). A large number of studies on adolescents' risky behaviors have found an association with stressful life events (Duell et al., 2018), i.e., a higher stress level led to more problematic behaviors in adolescents (Windle, 1992) and to internalizing and externalizing problems (Kim et al., 2003).

More recently, late adolescence has emerged as problematic when it also comes to online risky behaviors of wider student population (Valcke et al., 2011). These problems usually arise when young people experience stress in their lives. The presence of stress has a direct influence on the type of decisions that individuals make. Individuals under stress have limited cognitive resources as they are now recruited for emotion regulation, and, consequently, neglect to deal with inhibitory processes necessary to prevent risky behaviors, which results in more risky behaviors (e.g., Richards, 2004). Transferring this model to online risky behavior, it can explain how adolescents are trying to find an escape from the stressful reality in an online setting. They use the Internet to vent and since most of things on Internet go anonymously or without any punishment, adolescents probably feel less responsible for online risky behavior compared to that kind of behavior in reality. Moreover, recent studies consistently showed positive relations between stress and problematic Internet use, that is, stress preceded excessive use of the Internet (Feng et al., 2019) and online risky behaviors (Karaman, 2013). Stress facilitates online risky behaviors (Li et al., 2009). Types and intensity of risky behaviors in real life decreases in this age group due to severe and sometimes legal penalties, but online risky behaviors usually go unpunished and serve as a substitute for risky behaviors in reality. Interestingly, only a small amount of studies examines the influence of stressful life events on adolescents' risky behaviors online (Leung, 2007). These studies show that stress significantly increases the risk of problematic behaviors online (Leung, 2007; Li et al., 2009). Evidently, stress

plays a significant role in emerging risky behavior. Therefore, it would be helpful to investigate the possible role of stress in regulating the connection among those two, online and real-life, risky behaviors.

In the last decades, the significant role in risk-taking behaviors has been given to affective intensity and biobehavioral sensitivity to rewards in risk-taking behavior (Casey et al., 2008; Somerville et al., 2010; Steinberg, 2010). Maturation of brain structures responsible for appetitive drives, compensation, and novelty seek proceeds to maturation of prefrontal area responsible for cognitive and behavioral inhibition. Therefore, adolescents may be more prone to risky behaviors due to uneven maturation of motivational and cognitive control systems (Steinberg, 2008; Steinberg, 2010). Moreover, hypothalamic pituitary adrenal (HPA) axis activity is greater in adolescence than in another life period, which results in more significant stress reactivity (Lupien et. al., 2009). This may explain why adolescents are more prone to make poor decision while being in emotional arousal situations and under the social pressure or the presence of desired rewards (Ernst & Korelitz, 2009; Galvan, 2010) compared to adults. Research findings by Johnson et al. (2012) indicate that adolescents exposed to social evaluation (cognitive stressor) manifested less planning and more risk-taking behaviors than those not exposed to a stressor. In addition, same authors found that variability in adolescent responses to stress is related to an orientation toward risk-taking. Stressed adolescents are prone to risk-taking situations more than less stressed adolescents (Johnson et al., 2012).

On the other hand, diathesis-stress model postulates that psychological disorders result from the interaction between one's vulnerability for that disorder and an individual's experience with stressful events (Broerman, 2018). Applying this model to adolescents risky behaviors, one can conclude that real-life risky behaviors, which is often characteristic for adolescence, may interact with different stressor (adolescence is a time of particular stress reactivity), and consequently result with more often engaging in risky online behaviors (as IT are ubiquitous in the lives of adolescents). In this relation real-life risky behaviors can be seen as vulnerability for online risky behaviors. It is also probable that both, the same type of personality characteristics drives real-life risky behaviors and online risky behaviors, thus they may share the same diathesis. When the stress comes to play, it probably interacts with those personality traits increasing the probability of occurring both real-life risky behaviors and online risky behaviors.

Potential Risk and Protective Factors for Online Risky Behaviors

Risk and protective factors affect the likelihood of disorder occurring among different individuals. Risk factors refer to factors that are associated with a greater likelihood of experiencing a disorder. Those are descriptive variables that don't explain disorder development's actual mechanisms (it doesn't

explain how or why the condition occurs). On the other hand, protective factors or resilient factors refer to variables that diminish the possibility of experiencing psychopathology (Ingram & Price, 2010). According to Ingram & Price (2010), those two variables represent different vulnerability continuum ends. Relating to stress, a small amount of stress would cause disorder development on the risk end of the continuum (i.e., most vulnerable end of the range). On the other end of the vulnerability continuum is the opposite, protective end of continuum. On that end of vulnerability continuum, it would be necessary to experience a lot of stress for maladaptive behavior to develop (Ingram & Price, 2010). For example, on risk end of continuum real-life risky behaviors and information security awareness can be considered as risk factors in relation to stress and online risky behaviors while on the other end of continuum life satisfaction can serve as protective factor in relation of stress with online risky behaviors.

In the theory of risky behaviors and problem behaviors during adolescence (Jessor, 1991), problem behaviors are defined as the ones that depart from regulatory norms relative to age norms and expectations, while risky behaviors are defined as any behaviors that can influence psychosocial development negatively. Risk factors increase the likelihood of engaging in risky behaviors, while protective factors decrease the probability of engagement. Furthermore, engaging in one risky behavior increases the risk of involvement in more risky behaviors due to similar social and psychological functions that these behaviors may fulfill (Guilamo-Ramos et al., 2005). If adolescents focus on positive outcomes of risky behaviors, the likelihood of engagement will be high. Although adolescents are aware of and recognize potentially negative consequences of their risky behaviors, they have been found to focus more often on positive outcomes (e.g., peer acceptance, excitement, richer social life, etc.), which is the main reason why they are involved in risk-taking behaviors including online risky behaviors (Livingstone et al., 2011; Romer, 2003).

A significant amount of previous studies showed a positive association between different types of real-life and online risky behaviors, namely, adolescent real-life risky behaviors usually antecedes problematic Internet use in late adolescence (Duell et al., 2018; Šolić et al., 2015; Velki et al., 2015). However, some studies found a statistically significant moderate correlation between real-life risky and delinquent behaviors and online risky behaviors in adolescents (Velki et al., 2015). Moreover, older adolescent and young adult Internet users (18 to 30 year-olds) showed the riskiest online behaviors in Šolić et al. (2015). In the study by Velki and Romstein (2019) on user risky online behaviors throughout the lifespan, adolescents (college students with average age M = 21.93) reached a peak in risky online behaviors. In general, existing real-life problematic behaviors in adolescence can be considered as one of the risk factors influencing online risky behaviors.

Contrary to intuitive expectations, higher level of information security awareness and knowledge has been associated with more risky behaviors on-

line (Šolić et al., 2015; Velki & Romstein, 2019; Velki et al., 2015). Furthermore, previous studies showed that awareness and knowledge of information security were deficient in ensuring safe online behaviors, even in the case of highly educated university professors (Šolić & Ilakovac, 2009). Although adolescents are aware that their online behaviors are highly risky and with minimal benefits, they still engage in risky activities online (Livingstone et al., 2011). The paradox of privacy revealed that raising awareness about privacy issues failed to lead to increased use of privacy settings or taking measures to protect personal information on social networks. Children and young people share private data on Facebook despite being aware of privacy risks (Brstilo et al., 2014). On the contrary, higher level of knowledge and awareness instead to serve as protective factor led to more online risky behavior, such as revealing passwords to strangers or sharing private data (Livingstone et al., 2011; Velki & Romstein, 2019).

Another factor that can affect a person's involvement in risky behavior is overall life satisfaction. Overall life satisfaction can act as a protective factor in online risky behaviors (Shahnaz & Karim, 2014) and in engaging in risky behavior (Zerihun et al., 2014). Higher levels of life satisfaction are associated with lower levels of real-life risky behavior such as drug abuse and violence (MacDonald et al., 2005) and also Internet addiction and the specific addiction to social media (Longstreet & Brooks, 2017). Life satisfaction can reduce the adverse effects of life stress (Suldo & Huebner, 2004) and improve success in social problem solving (Jiang et al., 2016). More dissatisfied individuals mainly use the Internet because of feelings of boredom, to look for entertainment on the web, and to communicate on social networks, which increases their risky behaviors online (Kalmus et al., 2011).

Although a significant amount of studies mentioned above found correlations between stress and different types of risky behaviors in adolescence, mediating role of stress in the relationship between different types of risky behaviors in real life and online has not been explored yet.

Aims of the Study

The aim of the study was to examine the mediating role of stress in associations between online risky behaviors and risk and protective factors in late adolescence. Real-life risky behaviors and information security awareness, as risk factors, are tested for direct and indirect effect (via stress) on online risky behavior. Furthermore, life satisfaction, as protective factor, is tested for direct and indirect effect (via stress) on online risky behavior.

Previous studies established a positive association between real-life risky behaviors and online risky behaviors in adolescents (Velki et al., 2015) and it can be logically assumed that stress has a role to play in this association since it is well known that stress increases instances of both types of risky behaviors

(Leung, 2007; Li et al., 2009). Also, previous studies found positive associations between information security awareness and online risky behaviors despite the participating adolescents' perception of their nature as highly hazardous with minimal benefits (Brstilo et al., 2014; Livingstone et al., 2011). However, stress was absent in the examination of this particular relationship. Finally, certain protective factor, e.g., life satisfaction, proved to be connected to online risky behaviors. Adolescents who were more satisfied with their lives are less engaged in different types of online risky behaviors such as internet addictions, communications with strangers, private data revealing, etc. (Kalmus et al., 2011; Shahnaz & Karim, 2014), but stress as a mediator was not tested in this association.

According to the study aim, the Hypothesized mediation model (Figure 1) and associated hypotheses were tested:

H1: Stress will have a direct effect on online risky behaviors, in other words, a higher level of perceived stress will lead to riskier online behaviors of the participants.

H2: Stress will have a mediating effect on the association between the two risk factors and online risky behaviors, i.e., real-life risky behaviors and information security awareness will have a positive indirect effect on online risky behaviors through stress. Under stressed condition, the direct effect of risk factors on online risky behaviors will change due to limited cognitive resources dealing with stressors and because adolescents will try to escape from the stressful reality in an online settings where they can avoid punishment and responsibility for online risky behaviors compared to that kind of behaviors in reality.

H3: Stress will have a mediating effect on the association between life satisfaction as a protective factor and online risky behaviors, i.e., life satisfaction will have a negative indirect effect on online risky behaviors through stress. Partial mediation of stress is expected, in other words effect of life satisfaction on online risky behaviors will no longer be as strong as before stress condition in his protective role, because in the process of coping with stress more attention will be paid to the stressors and associated overwhelming emotions than to positive emotions that arise from life satisfaction.

Method

Participants

Students from four Croatian universities were chosen for participation: 78% of participants were from the University of Osijek, 13% from the University of Zagreb, 4% from the University of Rijeka, and 5% from the University of Zadar. The total number of participants was 883 with an average age of *M* = 21.93 years. Great majority were undergraduate students and 90% of them

were late adolescents as defined by their age (18 to 25 years old). Most of graduate students (80%) also were late adolescents as defined by their age (21 to 25 years old). Details of the sample are shown in Table 1.

Table 1
Distribution of participants by gender and university level

University level	Gender	*f*	%	Mean age
Undergraduate	male	183	24.70	*M* = 21.51 *SD* = 4.38
	female	557	75.30	
	total	740	83.80	
Graduate	male	33	23.10	*M*= 24.06 *SD* = 2.98
	female	110	76.90	
	total	143	16.20	
Overall	male	254	24.50	*M* = 21.93 *SD* = 4.29
	female	667	75.50	
	total	883	100.0	

Note. M – mean; *SD* – standard deviation.

Procedure

Ethics committee of the Faculty of Education, University of Osijek, approved the study which was a part of the larger project entitled "*Safer Internet Centre Croatia: Making the Internet a good and safe place*", Agreement Number: INEA/CEF/ICT/A2015/115320. Anonymous cross-sectional data were collected online during one academic year. After the deans of faculties from four Croatian universities had given permission for data collection with students, a link with questionnaires was distributed via shared e-mail address.

Instruments

Demographic data

The students filled out a form with demographic data including age, gender, year of study, university and college they had attended at the time of questionnaire completion.

Users' Information Security Awareness Questionnaire (UISAQ, Velki & Šolić, 2014; in Velki et al., 2015)

UISAQ measures information security awareness and consists of two parts with a total of 33 questions. The first part of UISAQ includes 17 items measuring computer users' potentially risky behaviors (item example: "*How often do you share your access data?"*). The second part of the questionnaire consists

of 16 items measuring the level of user's information security knowledge and awareness (item example: "*How risky is online communication?"*). The participants indicated the frequency of each risky behaviors and self-evaluated their security awareness on a 5-point scale ("*never*" - "*always*" and "*not risky*" - "*very risky*", respectively). The results for the scales were computed as an arithmetic mean of responses to the corresponding items and theoretically ranged from 1 to 5. The internal consistency for both subscales was satisfactory (Cronbach's α = .69 for the Scale of computer users' potentially risky behaviors, and α = .79 for the Scale of information security awareness).

Youth Self-Reported Delinquency and Risk Behaviors Questionnaire (Ručević et al., 2009)

Youth self-reported delinquency and risky behaviors questionnaire measures the degree of delinquent and risky behaviors in adolescents (item example: "*Engaged in theft or other criminal activity led by some of your friends"* or *"Smoked marijuana or hashish"*), and it consists of seven parts (*k* = 42): (1) Misdemeanor and minor delinquent behaviors, (2) Undesirable normative behaviors, (3) Risky sexual behaviors, (4) Drug abuse, (5) Violence in close relationships, (6) Serious delinquency - theft, burglary and robbery, and (7) Suicidal and self-aggressive behaviors. The participants indicated the number of times in their life they had exhibited a behaviors in question on the 5-point scale: 0 = *never* (1), 1-4 = *rare* (2), 5-10 = *sometimes* (3), 11-20 = *often* (4), 21 and more = *almost always* (5). The result was computed as an arithmetic mean of responses to all items and theoretically ranged from 1 to 5. The internal consistency for the whole questionnaire was satisfactory (Cronbach α = .89).

Life Satisfaction Scale (Penezić, 2002)

Life Satisfaction Scale consists of 20 items, divided into 2 subscales: 1) global life satisfaction (*k*=17) and 2) situational life satisfaction (*k*=3). For the purpose of this study only the first subscale was used (item example: *If I were to live again, I would change almost nothing*). It is a self-assessment scale and respondents indicate their agreement with statements on a 5-point Likert scale (from "strongly disagree" to "strongly agree"). The result for the subscale was computed as an arithmetic mean of responses to the corresponding items and theoretically ranged from 1 to 5. The internal consistency was high (Cronbach α=.95).

Perceived Stress Scale (Cohen et al., 1983; adapted Croatian version Hudek-Knežević et al., 1999)

Perceived Stress Scale measures the degree of subjective stress through assessments of lack of control, feelings of overload, and unpredictability

of life over the last few months. The scale contains 10 items (item example: "*How often have you felt nervous and stressed"?*) and respondents provide their answers on a 5-point Likert scale (from "*never*" to "*very often*"). The result obtained on the scale was computed as an arithmetic mean of responses to all items and theoretically ranged from 1 to 5. The internal consistency was satisfactory (Cronbach α = .86).

Data Analytic Plan

Taking into consideration proposed hypothesis three separate mediation analysis will be conducted with stress as mediator and online risky behaviors as criterion variable. For the first mediation analysis, predictor is real-life risky behaviors as risk factor, for the second information security awareness also as risk factor and for the third life satisfaction as protective factor. Mediation analyses is performed by using the macro Process version 3.5 in SPSS version 24. The number of bootstrap samples is 5000 and confidence interval 95%. The bootstrap confidence interval is used to test for significance of indirect effects. Mediation models that will be tested are shown in Figure 1.

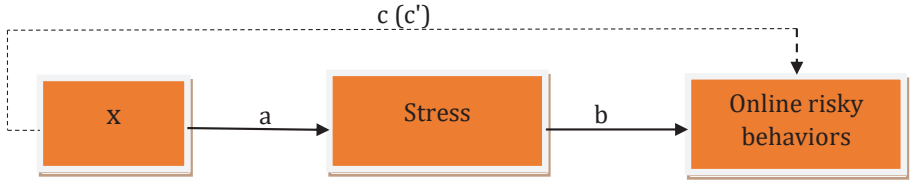

Figure 1. Hypothesized mediation models: stress as a mediator variable in the association between adolescents' online risky behaviors and the selected risk and protective factors (X).

In Figure 1, *a* represents unstandardized regression coefficient (b) for the association between the independent variable and the mediator, *b* represents unstandardized regression coefficient (b) for the association between the mediator and the dependent variable, *c* represents unstandardized regression coefficient (b) for the association between the independent variable and the dependent variable (in the absence of the mediator), which is a direct effect, and *c'* represents unstandardized regression coefficient (b) for the association between the independent variable and the dependent variable (in the presence of the mediator) or total effect. X represents predictors, for each mediation analysis different one, i.e., real-life risky behavior in first model, information security awareness in the second one and life satisfaction in the third one. Solid line is used for direct effects and dotted line for both effects, direct and total.

Results

Preconditions for parametric statistics and regression analysis were met (the predictor and criterion variables are quantitative and on an interval level, the predictor variances are not null, there is no perfect multicollinearity, i.e., the predictors are not too highly correlated with each other, there is no third variable in a moderating sense which could affect the correlation with the predictors, the homogeneity of variance is also satisfied, the Watson Durbin test showed error independence, i.e., the residuals are in null correlations, error distribution does not differ statistically significantly from normal distribution, the correlation of variables is linear and they are measured independently). Descriptive statistics were calculated (Table 2) for all variables included in the study. Hardly any variables deviated significantly from normal distribution. Indexes of asymmetry were within acceptable values (not greater than ± 2.00; Field, 2014), except for the real-life risky behaviors variable, but this was found acceptable as it measures delinquent and risky behaviors in adolescents and more often displays Poisson distribution of rare ("*sometimes"*) events. Both of the risky behaviors had a low frequency of occurrence ("*never"* or "*rare"*), the information security awareness was average, the life satisfaction was mostly high and the perceived level of stress in the last few months was average (i.e., "*sometimes"*).

Table 2
Descriptive statistics for variables measured in research

Variables	*N*	*Min*	*Max*	*M*	*SD*	*Sk*	*SE*	*Ku*	*SE*
Online risky behaviors	883	2.47	4.94	1.94	.42	-0.73	.09	0.55	.17
Real-life risky behaviors	883	1.00	5.00	1.33	.72	4.03	.09	8.77	.18
Information security awareness	883	1.66	4.83	2.92	.52	0.39	.09	0.68	.17
Life satisfaction	883	1.00	5.00	3.80	.73	-0.98	.09	1.66	.19
Stress	883	1.00	5.00	2.83	.69	-0.13	.09	-0.08	.19

Note. N – number of participants; *Min* – minimal score; *Max* – maximal score; *M* – mean; *SD* – standard deviation; *Sk* – skewness; *Ku* – kurtosis; *SE* – standard error.

Correlation between stress and online risky behaviors was statistically significant but low. Correlations between potential predictors and online risky behaviors were all statistically significant. Among predictors, only life satisfaction and real-life risky behavior were statistically significant correlated but low (Table 3). Taking into consideration rather small and mostly non-significant correlations between potential predicators, three separate mediation analysis were conducted.

Table 3
Pearson correlations for all measured variables

	Stress	Online risky behaviors	Real-life risky behaviors	Information security awareness
Stress	1			
Online risky behaviors	.11**	1		
Real-life risky behaviors	.34**	.22**	1	
Information security awareness	-.04	.26**	-.01	1
Life satisfaction	-.55**	-.11**	-.14**	-.06

Note. * $p < .05$. ** $p < .01$.

The first hypothesis was tested by means of regression analysis and for second and third hypothesis three separate mediation analysis were performed (Figure 2, 3 and 4).

The first hypothesis was confirmed. A higher level of stress in adolescents predicted more frequent online risky behaviors ($F_{(1,882)} = 8.09$, $p < .01$, $R^2 = .01$, $p < .01$). Nevertheless, this effect was very small. Only 1% of online risky behaviors variance was explained by stress.

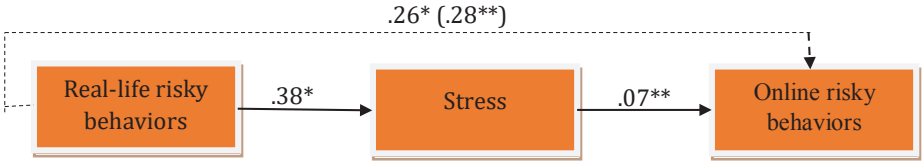

Figure 2. Results for the first Hypothesized mediation model: stress as a mediator variable in the association between adolescents' online risky behaviors and real-life risky behaviors.
Note. * $p < .05$. ** $p < .01$.

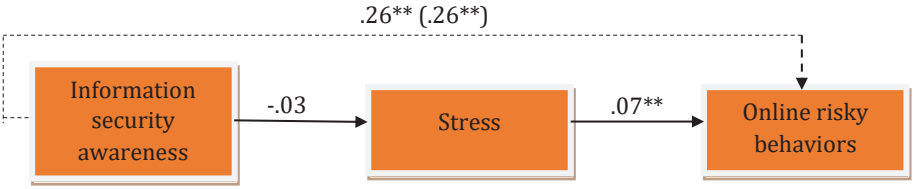

Figure 3. Results for the second Hypothesized mediation model: stress as a mediator variable in the association between adolescents' online risky behaviors and information security awareness.
Note. * $p < .05$. ** $p < .01$.

The second hypothesis was partially confirmed (Figure 2 and 3). Stress failed to exhibit a mediating role in the association between information security awareness and online risky behaviors (Figure 2), but mediation effect of stress was confirmed in the association of real-life risky behaviors and online risky behaviors (Figure 3, Table 4). Stress had a partially mediating role in the association of real-life risky behaviors and online risky behaviors (Figure 2). Moreover, under stressed conditions the strength of this association increases, in other words association between real-life risky behaviors and online risky behavior before including stress in model (b_1) becomes stronger after including stress in model (b_2) (b_1 = 0.26, p < .05; b_2 = 0.28, p < 0.01).

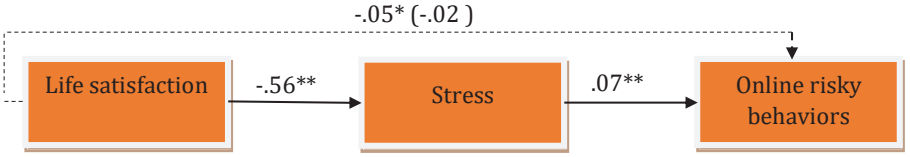

Figure 4. Results for the third Hypothesized mediation model: stress as a mediator variable in the association between adolescents' online risky behaviors and life satisfaction.
Note. * p < .05. ** p < .01.

The third hypothesis was also confirmed (Figure 4). There was a significant indirect effect of life satisfaction on online risky behaviors through stress, in other words mediation effect of stress was significant (Table 4). Stress had a full mediating effect on the association between life satisfaction and online risky behaviors, that is in the presence of the mediator the association between life satisfaction and online risky behaviors became statistically non-significant (b_1 = -0.05, p < .05; b_2 = -0.02, p > .05).

Table 4
Testing mediating role of stress

Relations with online risky behaviors	Indirect effect b, 95% [CI]
Real-life risky behaviors	.025 [.001, .055]
Information security awareness	-.002 [-.012, .007]
Life satisfaction	-.038 [-.070, -.005]

Discussion

The period of late adolescence has proven to be problematic for online risky behaviors in students' population (Escobar-Chaves & Anderson, 2008; Velki & Romstein, 2019). Studies conducted so far tested how real-life risky behavior, satisfaction with life and information security awareness predict online risky behavior. The aim of this study was to investigate at once the role of these concepts in performing online risky behavior but also to go beyond that and test the mediating role of perceived stress in this relationship. The direct effect of stress on online risky behaviors was tested first and the obtained results were expected but the effect found for stress was rather small. As stress increases in adolescents, online risky behaviors also increase. Some previous studies found that stress was a crucial antecedent of online risky behaviors in adolescents (Ah & Jeong, 2011). The small effect of stress in our study could be ascribed to the operationalization of the construct stress as a general feeling of stress (e.g., items like "*things not going as planned*" or "*were upset about something that happened unexpectedly*") and not situationally stress-specific or specific for a period of late adolescence (e.g., accepting new life roles). The participants in our study were in their late adolescence and beginning transition to young adulthood. In this phase of life stress could be a normative part of growing up (Sawyer et al., 2018), that is, it may be experienced positively (for example, a new job opportunity) and not only negatively. Students recognize and are aware of negative consequences of online risky activities (Romer, 2003), but increased stress leads them to focus more on instant positive outcomes and seek out a diversion in the online world.

A significant amount of previous studies confirmed that stress increases the effects of risk factors (Leung, 2007; Windle, 1992). To test the second hypothesis, mediating effect of stress was examined for the relationship between two risk factors (real-life risky behaviors and information security awareness) and online risky behaviors. Our findings partially confirmed the second hypothesis as stress showed to have a partially mediating role in the case of real-life risky behaviors but non-significant mediating role of stress was found for information security awareness. As adolescent real-life risky behaviors usually precede online risky behaviors in late adolescence (Duell et al., 2018) it was worth to explore what are possible mediators that can explain how the real-life risky behaviors leads to online risky behaviors. Stress, as mediator, potentially can explain these relations because when students feel stressed their cognitive capacity for making decision is overwhelmed with stressor leaving their inhibitory regulator system without capacity to deal with risk behavior (Welsh et al., 2019). Moreover, adolescents can try to escape from the stressful reality to virtual one. For them, Internet can serve as venting mechanism since online risky behavior most of the time go unpunished and without consequence in reality. According to impaired disengagement hypothesis (Koster et al., 2011), individuals under stress are prone to ruminative thinking which influences

their capacity to reconsider their risky behaviors. This in turn results in stronger associations between real-life risky behaviors and online risky behaviors. Partial mediation could be caused by high covariation, co-occurrence and associations between real-life and online risky behaviors established in a number of previous studies (Casas et al., 2013; Kowalski et al., 2014; Velki et al., 2015), although in obtained results correlation between real-life and online risky behaviors was significant but rather low (Table 3). Another possible explanation is that real-life and online risky behaviors are preceded by the same personality traits i.e., they share vulnerability, and therefore stress can only partially influence the connection between these two subtypes of same construct (i.e., risky behaviors).

Further, no mediation was found for stress in the association between information security awareness and online risky behaviors. In adolescence online risky behaviors reaches its maximum towards the end of formal education (i.e., final years at graduate level). In the same period there is a growth in knowledge and security awareness, probably a reflection of formal education, high-school and college curricula, thus making the association between information security awareness and online risky behaviors negative (Velki & Romstein, 2019). It seems that students act carelessly about revealing their passwords because they rely on the knowledge they themselves possess about data protection and somehow believe that thanks to this knowledge data theft cannot happen to them. However, this falsely created sense of security makes them the highest risk group. The same was found in previous research with highly educated participants (Šolić & Ilakovac, 2009).

Finally, the third hypothesis was confirmed. Stress had a fully mediating role in the association between life satisfaction and online risky behaviors. Other studies revealed an interaction effect between life satisfaction and stressful life events, that is, externalizing behaviors were predicted by stressful life events in subjects with low life satisfaction. This interaction provides support for the proposition that life satisfaction acts as a buffer against problematic adolescent behaviors including online risky behaviors (Proctor et al., 2009). In the present study, however, the protective role of life satisfaction becomes insignificant in connection to online risky behaviors when stress is included into the model. Under stressed conditions, students become preoccupied with negative thoughts and emotions and there is no room for positive emotions (Richards, 2004) despite feeling satisfied with their lives. Rumination, as well as worry, occurs as a reaction to stressful events (Smith & Alloy, 2009) and obstructs normal cognitive functioning by making one focus on these intrusive thoughts (Miyake et al., 2000). It is also possible that being under stress lowers students' satisfaction with life and makes them more vulnerable to online risks, in other words, students may try to escape from unsatisfying reality to more attractive virtual one. Protective role of life satisfaction is buffered by stress, which consequently leads to increase of the likelihood of online risky communication, suggesting that young people on the Internet in a way try to compensate for shortcomings

in real-life (Livingstone & Helsper, 2008). Since the present study has shown that the benefits of well-being cease in the presence of stress, perhaps some other protective factors should be examined in these relations in future studies.

Practical implications

Obtained results could have significant outcome on adolescents' life. Knowing the important role of stress in this sensitive life period, parents, educators and health care professionals could help in organizing safe environment and everyday activities for adolescents at risk. Previous risky behaviors, i.e. during the high-school education, in combination with stressful life events (such as going to other city for study, taking a part-time job, making career choice, etc.) could lead to problematic online behaviors. IT experts in cooperation with health care professionals could help to identify adolescents at risk and assist them in coping with stress. Organizing for them appropriate counseling (face-to-face or online), i.e., assuring them guidance in resolving personal, social, or psychological problems and difficulties, can be of extreme importance in dealing with everyday challenges and risk-taking behaviors.

Contributions and Limitations of the Study

Important contributions of the study are worth mentioning. This is one of the first studies that examined the role of stress as a mediator in associations between online risky behaviors and risk and protective factors. Previous studies mostly investigated the direct effect of stress on online risky behaviors and, usually, on younger adolescents. i.e., primary and secondary school students. However, late adolescence is a period marked by highest risk of problematic Internet behaviors. Transition to adulthood can provide negative and positive experiences of stress that new life roles bring to young people's lives. Future studies should include other risk and protective factors of relevance in this particular period of life, for example, peer and family relations or satisfaction with certain aspects of life (i.e., job. education. etc.). Furthermore, it would be interested to take into consideration personality traits since the same type of personality characteristics drives real-life risky behaviors and online risky behaviors, thus they may share the same diathesis. In addition, an examination of influence of positive stress on normative life events would be welcome.

However, shortcomings of the study are important to understand as well. The sample was not representative; the participants were mostly from one moderately-sized university (78%) and a much smaller number was from the most prominent university in Croatia (only 13%). Other limitations include smaller proportion of male participants (24.5%) as well as the fact that the measured variables were participants' self-assessments and not actual risky behaviors values. Further, only general life satisfaction and general feeling of stress were measured. Assessment of situated feelings could be more inter-

esting and, perhaps, more revealing. Finally, the study was cross-sectional in design. Future studies should consider longitudinal design.

Conclusion

The study corroborated the results obtained in previous studies on the significant role of stress in adolescents' lives (Ah & Jeong, 2011; Karaman, 2013; Leung, 2007). As expected, the association between real-life risky behaviors (risk factor) and online risky behaviors become stronger (although with a small indirect effect) under stressed conditions, due to the inability of an overwhelmed cognitive system to deal with negative emotions. Next, stress had a full mediating role and suppressed the life satisifaction (as a protective factor) in online risky behaviors. University students under stress were preoccupied with negative emotions instead of enjoying life, therefore, stress buffered associations between life satisfaction and online risky behaviors. In conclusion, stress seems not to trigger online risky behaviors per se but it has a major role in mediating these processes of prediction of online risky behaviors.

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Conflict of interest

We have no conflicts of interest to disclose.

Data availability statement

As this article is part of a larger research project, authors do not have permission to publish the whole dataset online (including raw and processed data), only to use data for research purposes and publish research data according to project aims and activities.

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STRES KAO MEDIJATOR IZMEĐU RIZIČNIH I ZAŠTITNIH ČIMBENIKA I ONLINE RIZIČNOG PONAŠANJA KOD ADOLESCENTA

Cilj studije bio je ispitati ulogu stresa kao medijatora u povezanosti online rizičnih ponašanja s rizičnim ponašanjima u stvarnom životu i svesti o informacionoj sigurnosti kao faktorima rizika, te s zadovoljstvom životom kao zaštitnog faktora. Učesnici su bili studenti univerziteta (N = 883, 40,5% muškog pola i 59,5% ženskog pola) prosečne starosti M = 21.93 godine (SD = 4,29). Popunili su Upitnik o informacionoj sigurnosti online korisnika, Upitnik samoprocene o delinkvenciji i rizičnom ponašanju mladih, Skalu zadovoljstva životom i Skalu percipiranog stresa. Medijacijska analiza otkrila je značajnu ulogu stresa kao medijatora u povezanosti između rizičnih ponašanja na mreži s rizičnim ponašanjem u stvarnom životu i zadovoljstvom životom. U povezanosti između rizičnog ponašanja u stvarnom životu i rizičnog ponašanja na mreži, stres je imao samo delimičnu medijacijsku ulogu. Međutim, stres je imao potpunu medijacijsku ulogu u povezanosti između zadovoljstva životom i rizičnog ponašanja na mreži. Ukupni rezultati ukazuju na to da se stres može smatrati osnovnim mehanizmom koji povezuje stvarni život i rizična ponašanja na mreži kod adolescenata. U stresnim uslovima, adolescenti se češće fokusiraju na negativne ishode jer svoje kognitivne resurse preusmeravaju na regulaciju emocija dok inhibitorni procesi neophodni da bi sprečili rizično ponašanje ostaju van njihove kontrole.

Ključne reči: stres, online rizično ponašanje, rizično ponašanje u stvarnom životu, zadovoljstvo životom, svest o informacionoj sigurnosti