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Association Between Problematic Internet Use and Health Risks in Adolescents With and Without Chronic Health Conditions

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ABSTRACT

Background. Sedentary and unhealthy lifestyle behaviors are modifiable health risks that often develop during adolescence. A comprehensive analysis of unhealthy behaviors in adolescents with and without chronic health conditions (CHC) could inform the development of more effective prevention approaches.

The aim. This study aimed to measure associations between Problematic Internet Use (PIU), lifestyle habits and subjective health complaints among adolescents with and without CHC. In addition, health behaviors and prevalence of subjective health complaints between adolescents with and without CHC were compared.

Methods. A total of 171 adolescents (87 without CHC and 84 with CHC) completed an online survey. The PIU was assessed by the Problematic and Risky Internet Use Screening Scale. The subjective health complaints assessed were somatic and psychological symptoms. Healthy lifestyle behaviors assessed were daily physical activities, time spent by screens, eating habits, and duration of sleep.

Results. The results showed that 21.83% of adolescents with CHC and 36.78% without CHC scored at risk for problematic internet use. Adolescents without CHC reported significantly more frequent psychological health complaints than their peers with CHC. This study found that multiple health complaints and unhealthy eating habits were significantly associated with PIU in adolescents with CHC, while nervousness and eating fast food in adolescents without CHC. Girls without CHC reported significantly higher PRIUSS scores and prevalence of subjective health complaints than boys ($p < .05$).

Conclusions. Adolescents without CHC reported significantly higher levels of moderate and vigorous intensity physical activities weekly than their peers with CHC. PIU behaviors are mainly associated with psychological health complaints and unhealthy eating behaviors in adolescents with and without CHC. These findings highlight the need to identify the specific problematic internet use activities that are associated with different health risks in adolescents.

Keywords: problematic internet use, chronic health conditions, lifestyle behaviors, health, adolescents.

INTRODUCTION

Different ways of using screens are a major part of contemporary life for many adolescents. Evidence of association between sedentary behaviors and multiple health risks has initiated development of guidelines in some countries, often recommending that screen-based activities should be limited to two hours per day (Mitchell et al., 2013; Tremblay et al., 2011). The screen time behaviors are significantly associated with internet use. About 94% of adolescents in Europe who have access to different information technologies reported using the Internet daily (Eurostat, 2020).

Problematic Internet use (PIU) has been defined as the incapacity to control an individual's use of the Internet, which leads to adverse consequences in one's daily life (Spada, 2014), for example, psychological, social, school, and/or work difficulties (Beard & Wulf, 2001). In this study we used PIU definition presented by Jelenchick, Hawk, & Moreno (2016) describing PIU as Internet use that is risky, excessive, or impulsive in nature that leads to adverse life consequences, specifically physical, emotional, social or functional impairment. While research examining the prevalence of PIU among adolescents is increasing (Costa & Patrao & Machado, 2019; Kokka et al., 2021; Machimbarrena et al., 2019), the extension of this research topic among adolescents with chronic health conditions (CHC) is limited. The potential for internet sources to empower young people with disabilities, through promoting a sense of belonging, identity and community has been emphasized. Also, belonging to online communities might increase socialization of young people who are isolated due to health conditions (The Children's Society and YoungMinds, 2018). A limited amount of evidence was received on how internet use actually has impacted health aspects in young people with CHC. Recent international study revealed that adolescents with long term illnesses or disabilities (LTID) spent more time on screen time behaviors than their peers without LTID concluding the risk of poor health outcomes associated with higher levels of sedentary behavior (Ng et al., 2018). The study by Alfredsson and colleagues (2019) reported that adolescents with intellectual disability (n = 114) reported higher prevalence of playing internet games than the reference group (n = 1161) (84% vs. 63%), while their social networks were minimal.

Since the time spent on the internet is related to sedentary behaviors replacing physical activity it is likely to be associated with the development of multiple health problems such as obesity (Robinson et al, 2017), musculoskeletal and psychological health problems (Marques et al., 2019; Restrepo et al., 2020). Subjective health is understood as a multidimensional construct that contains the physical, mental and social dimensions of a person's well-being (Kaman et al., 2020). Both

the benefits of physical exercises and the detrimental effect of sedentary behaviors on health of adolescents are well documented. Numerous previous research studies on large samples selected from the Health Behavior in School- aged Children (HBSC) studies found positive associations between physical inactivity and total time of screen-based activities (Ghekiere et al., 2019; Langoy et al., 2019). The research on sedentary lifestyle related health risks among adolescents with CHC is limited. A recent study by Healy and colleagues (2020) found that 18.7% of adolescents (aged 10–17 years) with CHC did not meet World Health Organization (WHO) guidelines in daily physical activity compared with 15.6% of adolescents without chronic conditions. The evidence about healthy lifestyle behaviors in adolescents with CHC present higher prevalence of obesity and cardiometabolic health risks (Saunders, Gray & Poitras, 2016).

The present study explored the association between problematic internet use behavior and health risks in adolescents with and without CHC. In addition, this study also aimed to compare the health behaviors and prevalence of subjective health complaints in adolescents with and without CHC.

METHODS

Participants

The sample of adolescents (between 11–18 years of age) with and without CHC from the country capital were targeted population in this study representing the largest regional school district in Riga, Latvia. Recruitment materials were distributed by email and in person addressing school administrations and municipality departments of education. All eligible adolescents were then invited to participate in the study. In total, study involved 87 adolescents without CHC attending general education programs (51 boys and 36 girls, mean age 13.36 years, SD= 2.2 and 14.04 years, SD= 2.27, respectively) and 84 adolescents with CHC included in special education programs (52 boys and 32 girls, mean age 14.35 years, SD= 1.92 and 13.68 years, SD=2.14, respectively). The CHC diagnoses included mild to moderate level of ADHD, learning disability, cerebral palsy, muscle disease and developmental delay. In the sample of participants with CHC boys were more represented than girls that is consistent with previous studies and international statistics indicating that the ratio between boys and girls in special education programs including students with ADHD, ASD is 2.0–4.5: 1 (Frances et al., 2022). The study was conducted according to the guidelines of the Declaration of Helsinki, and approved by the Latvian Academy of Sport Education. All subjects were informed about the study and provided informed consent. Parental consent was sought for those younger than 18 years of age. Data were collected between May

and December 2020. The link to a self-completed on-line survey was provided by researchers to the school administration or directly to adolescents after receiving signed consents. Participants completed 15–10 min online survey by using their smartphones or computers.

Variables and Measures

Problematic Internet Use. To assess PIU, adolescents completed the Problematic and Risky Internet Use Screening Scale (PRIUSS), a validated adolescent screening instrument (Jelenchick et al., 2014). The PRIUSS is an 18-item risk-based screening scale for PIU with questions organized into the three subscales: (1) social impairment (6 items), (2) emotional impairment (5 items), and (3) risky/impulsive internet use (7 items). Items are scored on a 4-point Likert scale ranging from "never" = 0 to "very often" = 4. A total PRIUSS score ≥ 26 indicates that the adolescent is at high risk for PIU, and score from 15–25 indicates intermediate risk for PIU (Moreno et al., 2019). At present, this remains the only validated screening tool for pediatric populations (D'Angelo &Moreno, 2020).

Healthy Lifestyle Behaviors. The healthy lifestyle behavior questions consisted of five sections: (1) subjective health complaints (8 items); (2) free time physical activity (4 items); (3) time spent using information technologies (2 items), and (4) eating habits (5 items), and (5) sleep quality (2 items). All questions were selected from the national survey of Health Behavior in School-aged Children (HBSC) according to previous research on association between screen time, subjective health complaints and health behaviors involving children and adolescents with CHC to make our results comparable with other authors (Healy et al., 2020; Ng et al., 2018; Restrepo et al., 2020). To obtain results on free-time daily physical activity, adolescents were asked to report the number of days and hours over the past week during which they were doing moderate-vigorous physical activities out of school. Responses were dichotomized into 7 times/hours per week and daily, according to the physical activity guidelines (WHO, 2020). Participants were asked to indicate how many hours per day they spent using different information technologies (IT) for non-educational purpose (e.g., watching TV, playing games, chatting, emailing, messaging on the internet etc.). A cutoff of 3 hours per day was used to allow for time spent reporting various ITs, and to keep the results comparable to a recent international study (Hoare, Milton, Foster, & Allender, 2016; Ng et al., 2018). Finally, adolescents were asked to respond five questions related to their eating habits and one question on sleep habits approved by the national survey of HBSC (Pudule et al., 2020). According to the guidelines of the scoring system used in the HBSC, all data were separately obtained for schooldays and weekend (Ravens-Sieberer et al., 2008).

Subjective health complaints. Subjective health complaints questions were related to four somatic and four psychological complaints (headache, stomach-ache, backache, dizziness, feeling depressed, irritability, feeling nervous and difficulties getting to sleep). Participants responded on a 5-point scale ranging from 1 –*"rarely or never"* to 5 – "*about every day"*. Multiple health complaints variables were identified if the adolescent reported two or more health complaints observed weekly. Additional derived variables of subjective health complaints (≥4 health complaints, somatic and psychological complaints) were calculated.

Statistical Analyses. Statistical analyses were performed using IBM SPSS 28. Descriptive outcomes were presented as means and standard deviations for continuous variables, and as frequencies and percentages for categorical variables, for weekdays and weekends. Correlation coefficients were defined as small (0.10 –0.29), moderate (0.30–0.49), and large (≥0.50) based on previous research (Biddle et al., 2014). Statistical procedures were used to analyze the relationship between the PRIUSS with additional factors and derived variables of subjective health complaints (≥4 health complaints, somatic and psychological complaints). Data outcomes between groups of adolescents without and with CHC was compared using independent t-test. The Multivariate General Linear Model (MGLM) was used to examine the associations between PRIUSS and additional factors (education program and gender) against of the subjective health complaints and healthy lifestyle behaviors variables in adolescents. A statistical significance levels of $p < .05$ and $p < .01$ was used for all analyses.

RESULTS

Descriptive analyses of dependent and independent variables. The mean PRIUSS scores for adolescents with and without CHC was 21.26 points (SD = 10.51) and 21.45 points (SD= 9.15), respectively, indicating moderate risk for PIU (15–25 points, Moreno et al., 2019) (see Table 1). There was no significant difference in PRIUSS total and subscale scores between the two groups. The girls without CHC had significantly higher total PRIUSS score than boys ($p = .01$), particularly in emotional impairment and risky and impulsive internet use subscales ($p = .04$ and $p = .02$, respectively). A total of 28.36% (n = 19) adolescents with CHC and 31.07% (n = 32) adolescents without CHC scored at risk for PIU (≥ 26 points).

In this study adolescents presented very low daily PA time per week. Only about 20% of participants reported PA participation level as recommended by the WHO (at least 60 min per day in MVPA). As presented in Table 1, the mean number of days spent in out of school physical activities per week for adolescents with and

without CHC was 3.56 days (SD = 1.85) and 4.03 days (SD = 1.47), respectively. Adolescents without CHC reported significantly more number of hours (h) spent in moderate and vigorous intensity physical activities (MVPA) during previous seven days, than their peers with CHC (2.52 h, SD = 2.36 and 1.65 h, SD = 1.93, respectively, p = .01).

Prevalence of screen time use was higher in weekends (mean number of hours 4.53, SD = 2.38 and 4.28, SD = 1.92) than during school days (mean number of hours 3.42, SD = 2.11 and 3.54, SD = 1.88) in both groups. Adolescents with and without CHC reported on average more than 8 hours sleep duration during weekdays, and more than 9 hours during weekends. The group of boys without CHC indicated significantly more sleep hours than girls during weekdays (p =.00), while girls with CHC reported significantly more sleep hours than boys (p .01).

Regarding eating habits, adolescents with CHC reported significantly higher prevalence of unhealthy eating such as "drink carbonated or sweetened drinks" and "eat ready-to-use packaging" (p = .001). The group of boys without CHC reported significantly more often eating breakfast and eating together with the family comparing to girls (p = .02 and p = .03, respectively), while such differences were not found between boys and girls with CHC.

While the overall prevalence of subjective somatic health complaints was similar in adolescents with and without CHC (p >.05, see Table 1), multiple psychological health complaints in adolescents without CHC were significantly higher than in their peers with CHC (p < .05). Specifically, irritability or bad mood (p = .01) and nervousness (p = .00) were significantly more prevalent in adolescents without CHC. The group of girls without CHC reported significantly higher prevalence of all subjective health complaints than boys (p <.05), except nervousness (p =.06).

Table 1. **Comparative outcomes of PRIUSS, healthy lifestyle behaviors and subjective health complaints score outcomes for adolescents with and without CHC.**

	Adolescents without CHC (n = 87)				**Adolescents with CHC (n = 84)**				**Adolescents total (n = 171)**			
	Boys without CHC (n=51)	**Girls without CHC (n=36)**			**Boys with CHC (n=52)**	**Girls with CHC (n=32)**			**Adolescents without CHC (n=87)**	**Adolescents with CHC (n=84)**		
	Mean (SD)	**Mean (SD)**	**p**	**Cohen's d**	**Mean (SD)**	**Mean (SD)**	**p**	**Cohen's d**	**Mean (SD)**	**Mean (SD)**	**p**	**Cohen's d**
Problematic Internet Use												
PRIUSS total (points)	19.31 (7.32)	24.47 (10.63)	.01	-.58	20.4 (9.67)	22.66 (11.78)	.36	-.21	21.45 (9.15)	21.26 (10.51)	.90	.01
Social Impairment	7.14 (3.08)	8.03 (3.38)	.21	-.27	7.65 (3.8)	7.69 (3.84)	.969	-.00	7.51 (3.22)	7.67 (3.79)	.76	-.04
Emotional Impairment	4.47 (3.07)	6.28 (4.66)	.04	-.47	4.54 (3.93)	5.38 (4.44)	.38	-.20	5.22 (3.89)	4.86 (4.12)	.55	.09
Risky and Impulsive Internet Use	7.71 (4.09)	10.17 (5.15)	.02	-.54	8.21 (4.25)	9.59 (5.07)	.20	-.30	8.72 (4.69)	8.74 (4.6)	.98	-.00
Healthy lifestyle behaviors												
Physical activities (days/ per week)	4.25 (1.47)	3.72 (1.45)	.09	0.365	3.79 (1.81)	3.19 (1.89)	.15	.32	4.03 (1.47)	3.56 (1.85)	.06	.28
Physical activities (hours per week)	2.80 (2.55)	2.09 (2.00)	.15	0.305	1.77 (1.97)	1.45 (1.87)	.46	.16	2.52 (2.36)	1.65 (1.93)	.01	.40
Screen time use on weekdays	3.3 (1.78)	3.87 (1.99)	.17	-0.308	3.62 (2.07)	3.11 (2.18)	.29	.24	3.54 (1.88)	3.42 (2.11)	.71	.05
Screen time use on weekends	4.11 (1.87)	4.5 (2.00)	.38	-0.200	4.87 (2.36)	4.0 (2.37)	.13	.36	4.28 (1.92)	4.53 (2.38)	.47	-.11
Sleep duration on weekdays	8.64 (.95)	7.94 (1.07)	.00	0.692	7.62 (1.79)	8.5 (1.29)	.01	-.54	8.35 (1.06)	7.96 (1.66)	.07	.28
Sleep duration on weekends	9.65 (1.39)	9.29 (1.63)	.29	.24	9.28 (1.84)	9.84 (1.65)	.17	-.31	9.49 (1.5)	9.51 (1.77)	.96	-.00

	Adolescents without CHC (n = 87)				Adolescents with CHC (n = 84)				Adolescents total (n = 171)			
	Boys without CHC (n=51)	Girls without CHC (n=36)			Boys with CHC (n=52)	Girls with CHC (n=32)			Adolescents without CHC (n=87)	Adolescents with CHC (n=84)		
	Mean (SD)	Mean (SD)	p	Cohen's d	Mean (SD)	Mean (SD)	p	Cohen's d	Mean (SD)	Mean (SD)	p	Cohen's d
Eat breakfast	2.31 (0.88)	1.75 (1.23)	.02	.54	2.04 (1.1)	1.88 (1.01)	.48	.15	2.08 (1.07)	1.98 (1.06)	.52	.09
Eat with family members	2.00 (.87)	1.61 (.77)	.03	.46	1.85 (.94)	1.56 (.88)	.16	.31	1.84 (.85)	1.74 (.92)	.45	.11
Eat at the screen	1.47 (1.01)	1.69 (.98)	.30	-.22	1.6 (1.01)	1.59 (.98)	.99	.00	1.56 (1.0)	1.6 (1.0)	.83	-.03
Eat fruits and vegetables	1.82 (.87)	2.03 (.70)	.22	-.25	1.88 (.81)	2.06 (.72)	.29	-.23	1.91 (.80)	1.95 (.77)	.71	-.05
Drink carbonated or sweetened drinks	1.08 (.89)	1.19 (.89)	.55	-.13	1.62 (.84)	1.31 (.69)	.07	.38	1.13 (.89)	1.5 (.80)	.00	-.44
Eat ready-to-use packaging	.67 (.79)	.67 (.76)	1.00	.00	.94 (.92)	1.41 (.80)	.01	-.53	.67 (.77)	1.12 (.90)	.00	-.54
Subjective health complaints												
≥4 health complaints	.20 (.40)	.53 (.51)	.00	-.74	.19 (.40)	.31 (.47)	.23	-.28	.33 (.47)	.24 (.43)	.17	.21
Headache	.49 (.99)	1.50 (1.56)	.00	-.80	.63 (.99)	.81 (1.15)	.47	-.16	.91 (1.34)	.70 (1.05)	.26	.17
Abdominal pain	.47 (.83)	1.19 (.95)	.00	-.81	.48 (.96)	.91 (1.17)	.09	-.40	.77 (.95)	.64 (1.06)	.41	.12
Back pain	.61 (1.17)	1.72 (1.54)	.00	-.83	.90 (1.24)	1.50 (1.67)	.08	-.42	1.07 (1.44)	1.13 (1.44)	.77	-.04
Dizziness	.35 (.72)	1.42 (1.36)	.00	-1.03	.58 (1.13)	.75 (1.14)	.49	-.15	.79 (1.15)	.64 (1.13)	.39	.13
Depression	1.02 (1.39)	1.94 (1.49)	.00	-.64	1.02 (1.39)	1.44 (1.54)	.21	-.28	1.40 (1.50)	1.18 (1.46)	.32	.15
Irritability or bad mood	1.76 (1.45)	2.42 (1.3)	.03	-.46	1.44 (1.45)	1.56 (1.41)	.70	-.08	2.03 (1.42)	1.49 (1.43)	.01	.384

	Adolescents without CHC (n = 87)				Adolescents with CHC (n = 84)				Adolescents total (n = 171)			
	Boys without CHC (n=51)	Girls without CHC (n=36)			Boys with CHC (n=52)	Girls with CHC (n=32)			Adolescents without CHC (n=87)	Adolescents with CHC (n=84)		
	Mean (SD)	Mean (SD)	p	Cohen's d	Mean (SD)	Mean (SD)	p	Cohen's d	Mean (SD)	Mean (SD)	p	Cohen's d
Nervousness	1.67 (1.45)	2.25 (1.32)	.06	-.40	1.13 (1.45)	1.44 (1.68)	.39	-.19	1.91 (1.42)	1.25 (1.52)	.00	.44
Difficulty falling asleep	0.86 (1.31)	1.94 (1.53)	.00	-.77	1.06 (1.41)	1.19 (1.67)	.71	-.08	1.31 (1.5)	1.11 (1.51)	.37	.13
Somatic complaints	.51 (.86)	1.56 (1.36)	.00	-.95	.81 (1.17)	1.00 (1.16)	.46	-.16	.94 (1.20)	.88 (1.17)	.73	.05

Table 2. **Multivariate analyses - GLM models.**

Model 1. Intercept	F(25,48) = 512.08, p=.001	Wilks' Λ = .004
Adolescents with/without CHC	F(25,48) = 1.619, p=.076	Wilks' Λ = .543
Priuss score	F(900,1135) = 1.184, p=.004	Wilks' Λ = .001
Adolescents with/without CHC *Priuss score	F(650,976) = 1.036, p=.312	Wilks' Λ = .001
Model 2. Intercept	F(25,27) = 730.115, p=.001	Wilks' Λ = .002
Adolescents with/without CHC	F(25,27) = 1.479, p=.161	Wilks' Λ = .423
Priuss score	F(900,703) = 1.114, p=.066	Wilks' Λ = .001
Gender	F(25,27) = 2.061, p=.035	Wilks' Λ = .344
Adolescents with/without CHC *Priuss score	F(550,538) = 1.036, p=.342	Wilks' Λ = .001
Adolescents with/without CHC *Gender	F(25,27) = .655, p=.855	Wilks' Λ = .623
Priuss score *Gender	F(425,444) = .975, p=.607	Wilks' Λ = .001
Adolescents with/without CHC *Priuss score *Gender	F(50,54) = .979, p=.530	Wilks' Λ = .276

Multi-variate analyses. Table 2 presents the relationship between the PIU (PRIUSS outcomes) and various independent variables. Model 1 examined association between PIU and education program variable (adolescents with CHC from special education programs and adolescents without CHC from general education programs). There was significant association between PIU and unhealthy behaviors, and subjective health complaints (F (900.113) = 1.184, p=.000; Wilks' Λ = .001). Using the education program as the co-factor study outcomes did not present significant association across groups of adolescents with and without CHC (F (25.48) = 1.619, p=.076; Wilks' Λ = .543). Study outcomes in the Model 2 with gender and school type as co-factors showed that only gender was significantly associated with PIU (F(25.27) = 2.061, p=.035; Wilks' Λ = .344), while the type of education program did not have significant association.

Table 3. **Correlation between PRIUSS total score, healthy lifestyle behaviors and subjective health complaints.**

	PRIUSS Total Adolescents without CHC (n=87)	**PRIUSS Total Adolescents with CHC (n=84)**
Healthy lifestyle behaviors		
Physical activities (days/ per week)	-.264 (p = .014)	-.164 (p = .137)
Physical activities (hours per week)	-.177 (p = .106)	-.159 (p = .157)
Screen time use on weekdays	.210 (p = .057)	.067 (p = .551)
Screen time use on weekends	.428 (p = .001)	.076 (p = .523)
Sleep duration on weekdays	-.401 (p = .001)	- .090 (p = .427)
Sleep duration on weekends	-.085 (p = .453)	- .090 (p = .441)
Eat breakfast	-.112 (p = .303)	-.084 (p = .453)
Eat with family members	- .266 (p = .013)	- .320 (p = .003)
Eat at the screen	.442 (p = .001)	.242 (p = .027)
Eat fruits and vegetables	-.083 (p = .450)	-.243 (p = .027)
Drink carbonated or sweetened drinks	.110 (p = .315)	.153 (p = .167)
Eat ready-to-use packaging	.222 (p = .039)	.199 (p = .070)
Subjective health complaints		
≥4 health complaints	.253 (p = .018)	.445 (p = .001)
Headache	.066 (p = .547)	.199 (p = .071)

	PRIUSS Total Adolescents without CHC (n=87)	PRIUSS Total Adolescents with CHC (n=84)
Abdominal pain	.189 (p = .080)	.243 (p = .026)
Back pain	.257 (p = .017)	.137 (p = .216)
Dizziness	.221 (p = .040)	.093 (p = .405)
Depression	.339 (p = .002)	.288 (p = .008)
Irritability or bad mood	.471 (p = .001)	.335 (p = .002)
Nervousness	.387 (p = .001)	.358 (p = .001)
Difficulty falling asleep	.262 (p = .015)	.373 (p = .001)
Somatic complaints	.280 (p = .009)	.214 (p = .051)
Psychological complaints	.392 (p = .001)	.413 (p = .001)

Correlation analyses. Table 3 presents overall low correlations between the total PRIUSS scores and healthy lifestyle behaviors, while moderate correlations were found with subjective health complaints. In both groups, adolescents with and without CHC, significant negative correlations were found between PIU and eating with family responses (r = -.32, p = .00 and r = -.266, p =.01, respectively). That is, the higher the PIU score, the less frequency the family eating together. Also, low but significant negative correlations for adolescents without CHC were between PIU and physical activity days per week (r = -.26, p = .001), sleep duration during weekend (r = -.401, p = .001), while for adolescents with CHC between PIU score and eating fruits and vegetables (r = -.243, p = .027). The moderate positive correlation in adolescents without CHC were between PIU and screen time use on weekends (r = .439, p = .001), eating at the screen (r = .428, p = .001). In both groups significant and positive correlations were demonstrated between PIU and multiple health complaints (r = .253, p = .001 and r = 445, p = .00). All psychological health complaints had significant low to moderate correlation with PRIUSS score in both groups with the strongest correlation with irritability or bad mood for adolescents without CHC (r = .493, p = .001) and difficulty falling asleep in adolescents without CHC (r = .373, p = .00). Overall, in both groups the more health problems were reported, the higher was PIU score.

DISCUSSION

The primary aim of this study was to assess the prevalence of PIU and explore its association with a variety of subjective health complaints and healthy lifestyle behaviors among Latvian adolescents with and without chronic health conditions

(CHC). To our knowledge this was the first research study exploring the implication of PIU on health risks of young people with and without CHC. Recent study by Healy et al. (2020) including large national sample of 24,405 youth aged from 10–17 years (10,997 participants with CHC) showed that 18.7% of children and adolescents with CHC did not meet any WHO healthy lifestyle guidelines compared with 15.6% of youth without CHC in the U.S. An earlier international study by Ng et al. (2018) demonstrated that adolescents with long term illnesses or disabilities (LTID) spent significantly more time using screens during weekdays and weekends compared with their peers without LTID. These outcomes were opposite to current study reporting no significant differences in adolescents with and without CHC regarding screen time use throughout the week. In this study the prevalence of the PIU was slightly higher in adolescents without CHC compared with their peers with CHC (31.07% and 28.36%, respectively). The gender related outcomes reported that girls had higher PRIUSS mean scores in both groups than boys with significant differences presented in general education subgroup. In this study gender was significant predictor of increased PRIUSS, indicating that it independently contributed to higher prevalence of PIU. These outcomes were in line with the national survey outcomes of the HBSC from 2018 reporting girls spending significantly more time by using different information technologies than boys (Pudule et al., 2020). Also, a recent study in Sweden concluded that girls scored higher social media related problematic internet use (Victorin et al., 2020). These outcomes were not consistent with findings in other studies reporting boys being at higher risk for PIU (El Asam et al., 2019; Hong et al., 2014; Vadher et al., 2019). The most likely explanation for conflicting gender related outcomes of PIU across different studies might be explained by the specific reasons and patterns underlying internet use in boys and girls. Several authors noted that boys would be more likely to present PIU for seeking new and exciting experiences, for example through gaming, while PIU by girls would be more likely linked with their need for social connection with friends (Anderson et al., 2016; Gámez-Guadix et al., 2014; Kircaburun et al., 2019). Overall, the results of this study supported reports from other studies showing that PIU among adolescents is a global phenomenon.

This study was consistent with previous research showing insufficient amount of daily physical activities (PA) in adolescents with and without CHC (Healy et al., 2020; Ng et al., 2018; Marques et al., 2019; Wouters, Evenhius, & Hilgenkamp, 2019). The group of adolescents without CHC reported significantly more hours spent in weekly PA than their peers with CHC ($p = .01$) reaching average 2.52 h/ per week compared to 1.65 h/ week for those with CHC. This might be explained by very limited out of school sport opportunities for adolescents with CHC in Latvia. In contrast, there are more than 80 state funded sport programs offering over

40 different sports options for children and youth without health problems across country (LMES, 2020). These results are in line with outcomes of other studies involving adolescents with health issues. For example, Case, Ross and Yun (2020) examined combined datasets of 3,010 U.S. children and adolescents (6–17 years old) with developmental disabilities (autism spectrum disorder, cerebral palsy, intellectual disability and other), and found that only approximately 1 in 5 of them engaged in 60 min of PA daily.

Previous studies have reported that physical inactivity and sedentary behaviors are associated with increased health risks (Anderson, Steen & Stavropoulus, 2017; Tremblay et al., 2016). In this study for both groups, adolescents with and without CHC, the average daily screen time exceeded the 3h cut-off with higher prevalence during weekends. Moreover, screen time use was significantly correlated with PIU in adolescents without CHC ($r = .42$, $p = .00$), while such correlation was not found for adolescents with CHC. This study demonstrated low negative significant correlation between PRIUSS total scores and hours of daily PA per week for adolescents without CHC. That is, the fewer hours were spent in PA, the higher PRIUSS score was presented in reports. The low correlation and inconsistency across the two groups in these data outcomes can be explained by the distinct constructs of physical activity, sedentary behaviors related to screen time and specific health implications (Tremblay et al., 2011). In this context, an adolescent can be physically active (for example, meet the physical activity recommendations) and still demonstrate problematic internet use.

The high prevalence of sedentary behaviors linked with PIU in adolescents' population is an important area of research because of its association with several health problems, unhealthy life habits, negative impact on interpersonal relationships and emotional well-being (Gámez-Guadix, 2014; Marques et al., 2019; White et al., 2018). Findings of this study showed that adolescents with CHC had significantly higher frequency drinking carbonated or sweetened drinks and eating fast food than adolescents without CHC. The decrease of healthy eating habits, particularly, decreasing trend of fruit and vegetable consumption in adolescence has been observed also in previous international studies (Albani, Butler, Trail, & Kennedy, 2017; Marques et al., 2020). The wide variety of food choice and multiple environmental aspects, for example, peer influence, family shopping habits and meals in schools, might explain the decrease in healthy meal consumption throughout adolescence. In Latvia many families including children with CHC are living below the poverty threshold (Cabinet of Ministers, 2021) which is the predominant factor associated with more unhealthy food choices. Parents need to save money for health services of their child and more likely use high energy density foods of lower quality.

Sleep duration for participants in this study was appropriate with mean results > 8 hours during weekdays and weekends for both, adolescents with and without CHC. There was negative significant association between PRIUSS and sleep hours during weekdays for adolescents without CHC. This might be related to biases in the self-reported surveys where adolescents reported time they go to sleep, while this could vary from the actual sleep onset. Similarly, wake-up times might be reported with some bias depending on daily school schedule. According to an earlier meta-study, sleeping patterns in adolescents appears to be multifactorial, influenced by biological processes, the effects of school and leisure activities competing for sleep, media use, and pubertal changes (Olds, Blunden, Petkov, & Forchino, 2010). Additional studies should explore sleep patterns and PIU association with health risks in adolescents.

This study adds novel information to the literature about the association between PIU and subjective health complaints in adolescents with and without CHC. Reported results indicated that girls from general education programs had significantly higher prevalence of multiple and independent health complaints than boys. These outcomes were in line with other national and international studies (Gobina et al., 2011; Pudule et al., 2020; Vaičunas & Smigelskas, 2019). The irritability or bad mood was significantly more reported by adolescents without CHC than their peers with CHC. The reported results indicated that multiple (more than four per week) subjective health complaints were significantly associated with PIU scores in adolescents with and without CHC. Also, all psychological health complaints (depression, irritability, nervousness and difficulty falling asleep) had significant positive correlation with PRIUSS total scores in both study groups. In this study the PRIUSS variable was a significant predictor of unhealthy behaviors and subjective health complaints. These outcomes partially are in line with previous international studies demonstrating positive association between PIU and mental (Anderson & Stavropoulus, 2017; Ciarrochi et al., 2016) and physical health (Keane et al., 2017) in adolescents. The prevalence rates for PIU and its association with health complaints, lifestyle behaviors vary considerably across studies, partially because of the continuous evolvement of the new research, different terminology and instruments used for diverse populations studied (Boubeta et al., 2015).

Study Limitations. There are several limitations to interpretation of this study's findings. The sample included in this study does not necessarily represent the entire population of that age. Since results are based on self-reported survey outcomes, any errors presented due to subjective reports and feelings might tend to mitigate the statistical associations, suggesting that the actual associations might

be stronger. Part of the data was collected during COVID 19 pandemic when temporary quarantine was announced in some schools, followed by remote education for about two weeks. The screen time measures could increase for some participants because they were using online education mode. However, observations and anecdotal notes during this study demonstrated that adolescents use of information technologies for leisure was also prolonged.

Furthermore, the participants' responses in PRIUSS that did not reach the 26-point threshold does not mean that these adolescents used internet appropriately. The high prevalence of excessive screen time use for more than 3 hours daily in both study groups requires more accurate measures of associations between screen time and problematic internet use. The overall high rates of physical inactivity and screen time in adolescents seem to provoke other unhealthy behaviors (e.g., eating at the screen, eating fast foods). This associations should be explored in depth among larger samples of children and adolescents to better understand the integrated nature of health risks related behaviors of daily life in youth population.

CONCLUSIONS

The present study provides empirical evidence for comparative outcomes and associations between PIU and subjective health complaints and unhealthy lifestyle behaviors in adolescents with and without chronic health conditions. Associations between PIU and identified health risks, highlights the importance of investigating PIU in larger samples due to multicomponent behavior patterns affected by different factors and the need to gain an understanding of mechanisms in order to inform public health.

Implication and Contribution

The evidence of PIU combined with physical inactivity and unhealthy diet in adolescents with and without CHC reveals an association with psychological health risks that should be considered to adapt the different interventions. Results from this study emphasize the fact that more research should be done on how to promote healthy lifestyles and to promote awareness among adolescents of the latent benefits to their health status. Particularly girls (age 15–16 years) from general education settings need regular screening for psychological health symptoms (depression, irritability, nervousness and difficulty falling asleep) so that so that immediately triage for further evaluation and treatment, and evidence-based interventions can be provided to these students. Overall, findings of this study have implications for early identification and prevention of the potential health issues related to PIU.

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Probleminio interneto naudojimo ir paauglių, sergančių ir nesergančių lėtinėmis ligomis, pavojaus sveikatai ryšys

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SANTRAUKA

Įvadas. Pasyvus ir nesveikas gyvenimo būdas yra pavojus sveikatai, kuris dažnai išsivysto paauglystėje. Išsami žalingo elgesio tarp paauglių, sergančių lėtinėmis sveikatos ligomis, analizė galėtų padėti sukurti veiksmingesnius prevencijos metodus.

Tikslas – išmatuoti ryšį tarp probleminio interneto naudojimo (PIN), gyvenimo būdo įpročių ir subjektyvių sveikatos nusiskundimų tarp paauglių, sergančių ir nesergančių lėtinėmis ligomis. Be to, lyginamas su sveikata susijęs elgesys ir subjektyvių sveikatos nusiskundimų paplitimas tarp paauglių, sergančių ir nesergančių lėtinėmis ligomis.

Metodai. Iš viso 171 paauglys (87 nesergantys lėtinėmis ligomis ir 84 sergantys) užpildė internetinę apklausą. PIN buvo įvertintas probleminio ir rizikingo interneto naudojimo atrankos skale. Vertinti subjektyvūs sveikatos skundai buvo somatiniai ir psichologiniai simptomai. Įvertintas sveikos gyvensenos elgesys buvo kasdienė fizinė veikla, laikas, praleistas prie ekranų, mitybos įpročiai ir miego trukmė.

Rezultatai. Rezultatai parodė, kad 21,83 proc. paauglių, sergančių lėtinėmis ligomis, ir 36,78 proc. nesergančių, kyla problemų dėl interneto naudojimo. Paaugliai, nesergantys lėtinėmis ligomis, daug dažniau skundžiasi psichologine sveikata nei jų bendraamžiai, sergantys lėtinėmis ligomis. Šiame tyrime nustatyta, kad dauginiai sveikatos skundai ir nesveikos mitybos įpročiai buvo reikšmingai susiję su PIN paaugliams, sergantiems lėtinėmis ligomis, o paaugliams, kurie nesirgo, nustatytas nervingumas ir greito maisto valgymas. Merginos, nesergančios lėtinėmis ligomis, nurodė reikšmingai aukštesnius PRIUSS balus ir subjektyvių sveikatos nusiskundimų dažnumą, lyginant su berniukais ($p < 0,05$).

Išvados. Paaugliai, nesergantys lėtinėmis ligomis, rodė žymiai didesnį vidutinio ir intensyvaus fizinio aktyvumo lygį per savaitę nei jų bendraamžiai, kurie sirgo lėtinėmis ligomis. PIN elgesys labiausiai susijęs su psichologiniais sveikatos nusis-

kundimais ir nesveika mityba, tiek paaugliams, sergantiems lėtinėmis ligomis, tiek ir nesergantiems. Šios išvados pabrėžia poreikį nustatyti konkrečias problemines interneto naudojimo veiklas, susijusias su skirtingais pavojais paauglių sveikatai.

Raktažodžiai: probleminis interneto naudojimas, lėtinės sveikatos būklės, gyvenimo būdas, sveikata, paaugliai.

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