Research Article

Learning self-regulation: an important soft skill for AYAs

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Abstract

Background: The ability to self-regulate plays a critical role in accomplishing the developmental tasks in the stages of late adolescence, early adulthood and general psychosocial wellbeing.

Aims: As part of the Association of Adolescent and Child Care in India's multicentric studies on youth behaviour, the current study aimed to understand the effect of self-regulation, total, short-term and long-term as measured by the ASRI in female college-going students. We also studied these scores in relation to sociodemographic factors such as gender, age, sibling status, along with other variables such as perceived control over one's life on self-regulation abilities.

Methods: A cross-sectional study was conducted using convenience sampling. Participants (n = 354) were in the age groups between 17 to 19 and 20 (late adolescence) to 21 years (young adults), pursuing B.A., BCom., or BSc. in a college in North India. The Adolescent Self-Regulatory Inventory (ASRI) was administered to participants in order to assess both short-term and long-term self-regulation.

Permission: Ethical clearance for this project was given by AACCI's Institutional Ethics Committee.

Tool used: Moilanen Adolescent Self-regulation Inventory ASRI. The Internal consistency (alpha) for the ASRI was 0.75 for short-term self-regulation scale and 0.80 for long-term self-regulation scales. Confirmatory factor analyses were performed to check for the inventory's validity, two factors were used, short-term and long-term self-regulation, factors correlated 0.83.

Statistical analysis: The data was analysed using the Jeffreys's Amazing Statistics Program (JASP 0.17.2.0). T-tests were conducted to study the effects of age, engagement in extracurricular activities, perceived internet and social media dependence, and substance use on the ASRI. One-way ANOVAs were conducted to determine the effects of sibling status, academic course, and perceived control over one's life on the ASRI. Additionally, we also used the Kruskal-Wallis test, Mann-Whitney U test, Welch's test and Levene's test of equality of variances. The statistical significance of the calculated coefficients was considered at $p<0.05$.

Results: The participants who self- perceived that they had control over their lives had higher scores for overall self-regulation ($p=0.002$), short-term ($p=0.03$) and long-term self-regulation ($p=.004$) on the ASRI compared to those who were not sure and those who did not believe that they had any control over their lives. Participants who self -perceived that they were dependent on social media had lower scores on short-term ($p=0.01$) and long-term self-regulation ($p=0.01$) on the ASRI compared to those who did not perceive themselves as being dependent on social media.

Conclusion: Our sample showed that among all the variables we examined e.g., age sibling status, participation in extracurricular activities and tobacco, alcohol consumption , significant results were found for only two variables that accessed students' self-perception (control over one's life and social media usage). This suggests that at the stages of late adolescence and young adulthood, self-perception contributes to self-regulation abilities.

Keywords: self-regulation, short-term self-regulation, long-term self-regulation, adolescents, young adults, College Girls, Perceived Self-Control

Abbreviations: AACCI, association of adolescent and child care in India; ASRI, adolescent self-regulatory inventory; CYRM-28, Child and youth resilience measure-28; RSES, self esteem scale by Rosenberg's (1969); EI scale, emotional intelligence scale by Schutte et al.; SSES, social self efficacy scale by Connoly's (1989); JASP, Jeffreys's amazing statistics program; B.A, Bachelor of Arts; BCom, Bachelor of Commerce; BSc, Bachelor of Science; ANOVA, Analysis of Variance; n, Number of participants; M, Mean; SD, standard deviation; t, t-value; F, statistic for ANOVA; U, Statistic for Mann-Whitney test; H, Statistic for Kruskal-Wallis test; AYA, Adolescents and Young Adults

Introduction

Self-regulation is a neuropsychological skill that affects psychological well-being and has implications across multiple domains, including emotional, social and physical health. It includes

managing one's thoughts, feelings and emotions in a goal-directed manner that enables effective functioning.[1] It develops into adulthood and plays an important role in academic achievement and behavioural organisation.[2] The development of self-regulation in adolescence is dependent on neurocognitive maturational processes such as the maturation of the prefrontal cortex, which underlies several important skills including goal-setting and adaptive regulatory abilities.[3] Failures in self-regulatory behaviour are a core feature of many psychological problems.[4]

Enhanced self-regulatory skills leads to better attention capacity, behaviour planning, thought monitoring and control etc. Poor self-regulation could lead to challenges in cognitive processes such as attention, affecting academic performance and leading to behavioural problems. Young people with high levels of self-regulation tend to be better able to deal with challenges and peer pressure.[2] According to theorists, adolescents can regulate their behaviours both in the short and long-term contexts to achieve their goals, allowing them to plan and prepare for events that are near or in the future.[3] Deficits in self-regulation can lead to problematic behaviours such as substance abuse and antisocial behaviours, gambling, poor financial decision-making, unsafe sexual practices etc.[4,5]

Short-term self-regulation is defined as impulse, attentional or emotional control in the immediate circumstance, whereas long-term self-regulation consists of controlling one's impulses or efforts over a long period of time (i.e., days, weeks, months etc). Both of these components of self-regulation have often been neglected in the study of adolescence.[1] Most of the research has focused on child or adult populations.[2]

Background

Self-regulation is considered a popular topic of study in the field of psychology, as it is a predictor of developmental outcomes. In the current study we investigated self-regulation in late adolescence and young adulthood (17 to 21 years) as this age group experiences major transitions in their occupational responsibilities and psychosocial development. This stage is important as it sets the tone for psychological wellbeing in the later stages of development. Being a period of many transitions, it is also the stage at which many mental disorders have their onset. The development and enhancement of neuropsychological skills can serve to be a protective factor that can buffer against poor mental health. In the current study we aimed to understand the effect of self-regulation, total, short-term and long-term as measured by the Moilanen ASRI in female college-going students. We also examined the effects of multiple demographic factors (e.g., age, siblings etc.) and factors such as engagement in extracurricular activities, perceived internet dependence, social media dependence, substance use and perceived control over one's life in relation to self-regulation. More importantly, we examined self-perception in the context of self-regulation, which is important as insight leads to increased perception of one's problems subsequently leading to effective behaviour change.[2] Currently, not many studies have focused on self-regulation in the context of self-perception. We have also examined the abovementioned variables in relation to both short-term and long-term regulation in the current study.

AACCI works actively in the area of improving soft skills in this age group. This study was part of multicentric studies conducted among students, as part of an initiative to build resilience.

Methodology

Aims and objectives

In 2017, the Association of Adolescent and Child Care in India (AACCI) initiated the project on "Building Resilience" among school and college students in India. As part of this project, AACCI has been conducting multicentric studies on youth behaviour using standardized psychometric tools to study: a) resilience and b) some components that help to build resilience, such as self-esteem, self-regulation, emotional intelligence, and social self-efficacy. Based on the findings from the surveys, AACCI continues to customize various intervention programs in addition to the Life Skill education workshops that are regularly conducted in various schools and colleges for the holistic wellness of children and adolescents. The current study aimed to determine the scores of the Moilanen Adolescent Self-Regulatory Inventory in (n=354) college girls from a women's college in Delhi and draw age-based comparisons (group I: 17-19 yrs. and group II- 20-21 yrs.) for the same. AACCI has published a study conducted with females studying in an engineering college in Pune[6] to explore the relationships between individual scale scores and socio-demographic variables, including age, sibling status, and academic course (B.A., BCom, and BSc.), engagement in extracurricular activities, perceived Internet and social usage and media dependence, substance use, and perception of control over one's life.

Sample characteristics

Participants included in the study were girls (n = 354; M_{age} = 18.63 yrs., SD = 1.06 yrs.; age range: 17-21 yrs.) pursuing B.A., BCom., or BSc. in a college in North India.

Sample selection

This was a convenience sampling. We planned an awareness program in an all-women's college in North India (pursuing B.A., BCom., or BSc. Courses) and asked for volunteers to fill our questionnaire. Participants filled the online survey questionnaires under supervision by one Professor from the college and a team of student volunteers trained by AACCI.

Exclusion and inclusion criteria

There were no exclusion criteria, and all the students who volunteered to participate in the survey were included in the study.

Study duration

The study spanned across a three-month period from July to September 2018.

Study design

A cross-sectional study was conducted using convenience sampling.

Tools used

Five psychometric scales were administered to all the participants that agreed to be part of this survey.

1. Resilience was measured using (CYRM-28)- Child and Youth Resilience Measure-28.[7,8]

2. Self-esteem was measured using – RSES -Rosenberg's (1969) Self Esteem scale.[9,10]

3. Self-Regulation was measured using Moilanen's (2007) ASRI - Adolescent Self-Regulation Inventory.[1]

4. Emotional Intelligence -- was measured by using Schutte et al., (1998) EI scale.[11,12]

5. Self-efficacy – was measured by using Connoly's (1989) SSES – Social Self efficacy.[13]

Our results of other 4 scales studies are being presented in other individual papers.

This paper discusses the analysis of results pertaining to the Adolescent Self-Regulatory Inventory (ASRI) by K L. Moilanen[1] which was used for this study. The ASRI is a questionnaire that assesses two aspects of self-regulation, short-term and long-term. The items of the self-report inventory cover, aspects of parenting behaviours, and psychological adjustment. The ASRI has a total of 28 items, measured on a 5-point Likert scale (Not at all true/Neither true nor untrue for me/ somewhat true for me/completely true for me). Internal consistency (alpha) for the ASRI was 0.75 for the short-term self-regulation scale and 0.80 for the long-term self-regulation scales.[1] Confirmatory factor analyses were performed to check for the inventory's validity, two factors were used, short-term and long-term self-regulation, factors.

Permissions and ethical considerations

Ethical clearance for this project was given by AACCI's Institutional Ethics Committee. Permission for conducting the current study was procured from the college's principal. Informed consent was obtained via the questionnaire. This was not a clinical trial, and the participants were not patients.

Statistical analysis

The data was analysed using the Jeffreys's Amazing Statistics Program (JASP 0.17.2.0). T-tests were conducted to study the effects of age, engagement in extracurricular activities, perceived internet and social media dependence, and substance use on the ASRI. Further, one-way ANOVAs were conducted to determine the effects of sibling status, academic course, and perceived control over one's life on the ASRI. Additionally, we also used the Kruskal-Wallis test, Mann-Whitney U test, Welch's test and Levene's test of equality of variances. The statistical significance of the calculated coefficients was considered at $p < 0.05$.

In the questionnaire provided to participants we also collected information of demographic variables such as age, sibling status (No sibling/ One sibling/ More than one sibling), academic course (B.A. / BCom. / BSc.), participation in inter school/ college sports competitions, participation in other inter school/ college sports competitions, internet usage, internet dependency, social media, social media dependency, tobacco consumption, alcohol consumption, and perceived life control. The current study also explored the relationship between the following demographic variables and individual scale scores.

Sociodemographic variables

Age

Several studies using functional MRI and PET scans have shown that brain development begins from behind and towards the front, that is, the hypothalamic limbic system (which controls our emotions) matures first and the prefrontal cortex (which controls the hypothalamic limbic system and helps to make rational decisions with an ability to see the future consequences of one's actions) matures last–at around 25 yrs. Hence, it is expected that there may be age-based differences in brain development among adolescents (17-19 yrs.) vs. young adults (20-21 yrs.) in the current sample.[14] Accordingly, the sample was divided into two groups and age-based differences in self-regulation were studied.

Sibling status

AACCI also wanted to explore the relationship between sibling status (no siblings, one sibling, and more than one sibling) on self-regulation. Siblings have been recognized as a source of support, strength, and affection. Self-regulation can differ among individuals who have grown up among siblings, learned to share, talked about their feelings, and supported one another. Adlerian studies on sibling rivalry have shown associations with unhealthy competitiveness, perceived parental rejection, and poor self-image.[15] Accordingly, the current study aimed to explore differences in self-regulation among participants who had no siblings, one sibling, or more than one sibling. We have not conducted an in-depth analysis of the gender and age of siblings, inter-sibling relationships, sibling rivalry, differential parenting, etc. as that was not the focus of our study.

Academic course

One's choice of academic pursuits often depends on their aptitude, interest, and realities (familial pressure, finances, grades, etc.). Different streams have different entrance requirements, tap on various soft skills, demand different intensities of work, and require varying coping and regulatory strategies; the struggles for the same could impact the students' self-regulation. Accordingly, the current study explored differences in self-regulation among participants pursuing BSc, BA, and BCom.

Participation in intercollegiate non-athletic competitions

Participation in intercollegiate competitions is known to increase self-confidence and self-esteem and also enhance the ability to deal with stress, reduce performance anxiety, and strengthen other soft skills.[6]

Accordingly, the current study tried to see if there is a difference in self-regulation among participants who participated (vs. did not participate) in intercollegiate non-athletic competitions.

Participation in intercollegiate athletic competitions

Sports are known to enhance executive functions, teamwork, resilience, and the capacity to deal with failures. Our previous study showed that the engineering college girls who participated in sports competitions scored higher on social self-efficacy and self-regulation than non-participants.[6] Accordingly, the current study tried to see if there is a difference in self-regulation among participants who participated (vs. did not participate) in intercollegiate athletic competitions.

Internet usage; social media usage; self-perceived dependence on the Internet; and self-perceived dependence on social media

During the global pandemic of COVID-19, the internet and social media were primary sources that fostered connectedness. This continued post-COVID and has led to issues like addiction, breach of privacy, and disconnect from the real world. AACCI has previously studied the impact of Internet addiction using Kimberly Young's Internet addiction test.[16] As we had studied the psychometric scales in addition to socio-demographic questions in this study, we did not add the IAT scale to avoid fatigue among participants while filling out the questionnaire. Since these were all between the ages of 17 and 21 yrs. and mature enough to report their self-perception, we inquired about their self-proclaimed dependence on the Internet (yes vs. no) and on social media (yes vs. no) on self-regulation. This was preceded by an inquiry about whether they used the internet and social media (yes vs. no).

Consumption of alcohol; and consumption of tobacco

Consumption of substances is a common occurrence in adolescence and young adulthood. Indulgence in substance use is often a result of

curiosity and experimentation, peer pressure, or even an unhealthy coping mechanism during distressing situations.[17] The ability to say no and refrain from this indulgence requires high self-esteem, emotional regulation, and self-control. Hence, we explored the differences in the scores of participants who consumed (vs. did not consume) alcohol and (vs. did not consume) tobacco.

Self-perceived control over one's life

Several studies have established associations between perceived control over one's life (yes/no/maybe), self-regulation, and one's overall well-being. AACCI has previously studied the impact of perceived self-control.[18]

Procedures

1. Child and Youth Resilience Measure (CYRM-28; Ungar & Liebenberg, 2011),
2. Social Self-efficacy Scale (SSES; Connolly, 1989),
3. Schutte Emotional Intelligence Scale (SEIS; Schutte et al., 1998),
4. Adolescent Self-Regulation Inventory (ASRI; Moilanen, 2007), and
5. Rosenberg's Self-esteem Scale (RSES, Rosenberg, 1965).

AACCI has published an earlier study on some of these scales,[19] exploring their distinct relationships with the demographic variables for the same cohort. The current paper discusses the analysis of results pertaining to the Adolescent Self-Regulatory Inventory (ASRI).

Results

(Table 1–10)

Table 1 Age-wise distribution of ASRI scores (n = 354)

	Age					
	Late adolescence (n= 275)			**Young adults (n= 79)**		
	(Group 1: 17-19 yrs.)			**(Group II: 20-21 yrs.)**		
ASRI	**n %**	**Range**	**ASRI (M±SD)**	**n %**	**Range**	**ASRI (M±SD)**
Total Self-Regulation Score	275 77.60%	119-65	93.62±11.99	79 22.30%	125-60	93.02±10.90
Short-term Regulation Score	275 77.60%	30-55	40.66± 6.53	79 22.30%	30-56	40.74± 5.18
Long-term Regulation Score	275 77.60%	30-70	52.95± 7.56	79 22.30%	33-68	52.27± 8.00

Table 2 ASRI scores and relationship with age (n=354)

Variable	Age	Number (%)	Mean ± SD	Median	t/U	df	P-value
Total ASRI scores	Group I: 17-19 yrs.	275/77.6%	93.62±11.99	NA	0.4	352	0.69
	Group II: 20-21 yrs.	79/22.3%	93.02±10.90	NA			
Sub-scale scores							
Short-term regulation	Group I: 17-19 yrs.	275/77.6%	40.66± 6.53	40	10745.5		0.88
	Group II: 20-21 yrs.	79/22.3%	40.74± 5.18	40			
Long-term regulation	Group I: 17-19 yrs.	275/77.6%	52.95± 7.56	NA	0.693	352	0.48
	Group II: 20-21 yrs.	79/22.3%	52.27± 8.00	NA			

A Mann-Whitney U test was used to examine the effect of age on short-term regulation as the assumption for normality and equal variances were not met.

Table 3 ASRI scores and relationship with academic courses (n=354)

Variable	Course	Number (%)	Mean±SD	t/F/H	df	P-value
Total ASRI scores	B.A.	70/19.7%	94.88±12.99	1.27	2	0.28
	BCom.	43/12.1%	95.04 ± 10.81			
	BSc.	241/68%	92.80 ± 11.51			
Sub-scale scores						
Short-term regulation	B.Com	43/12.1%	41.744±5.555	6.359	2	**0.04**
	B.Sc	241/68%	40.207±6.147			
	BA	70/19.7%	41.686±6.858			
Long-term regulation	B.Com	43/12.1%	53.302±7.340	0.267	2	0.76
	B.Sc	241/68%	52.602±7.519			
	BA	70/19.7%	53.200±8.387			

p-value* <0.05

Note: A Kruskal-Wallis test used to analyse the effect of courses on short-term self-regulation as one of the groups did not meet the assumption for normality.

Table 4 ASRI scores and relationship with participation in interschool/ college sports competitions (n=354)

Variable	Participation in inter school/ college sports competitions	Number (%)	Mean±SD	Median	t/F/U	df	P-value
Total ASRI scores	Yes	55/15.5%	94.07±13.33	NA	-0.39	352	0.69
	No	299/84.46%	93.38±11.45	NA			
Sub-scale scores							
Short-term regulation	Yes	55/15.5%	41.12±6.43	40.00	7827.00	NA	0.57
	No	299/84.4%	40.60±6.22	40.00			
Long-term regulation	Yes	55/15.5%	52.94±8.81	NA	-0.13	68.885	0.89
	No	299/84.4%	52.77±7.44	NA			

Note: The Mann-Whitney U test was used to analyse the effect of participation in interschool/college sports competitions and short-term self-regulation as the assumption of normality was not met.

Note: The Welch's test was used to analyse the effect of participation in interschool/college sports competitions and long-term self-regulation as the Levene's test of equality of variances was significant.

Table 5 ASRI scores and relationship with participation in other interschool/ college competitions (n=354)

Variable	Participation in other interschool/ college competitions	Number (%)	Mean±SD	Median	t/F	df	P-value
Total ASRI scores	Yes	111/31.3%	94.50±11.44	NA	1.09	352	0.27
	No	243/68.6%	93.02±11.88	NA			
Sub-scale scores							
Short-term regulation	Yes	111/31.3%	41.00±5.76	40.00	12568.50		0.30
	No	234/66.1%	40.54±6.46	40.00			
Long-term regulation	Yes	111/31.3%	53.50±7.67	NA	1.162	352	0.24
	No	234/66.1%	52.48±7.64	NA			

Note: The Mann-Whitne U test was used to analyse the effect of participation in other interschool/college sports competitions and short-term self-regulation as the assumption of normality was not met.

Table 6 ASRI scores and relationship with self-perceived internet usage on total ASRI self-regulation scores (n=354)

Variable	Internet usage	Number (%)	Mean±SD	Median	U	P-value
Total ASRI scores	Yes	352/99.4%	93.49±11.75	93.00	344.50	0.96
	No	2/0.5%	93.49±11.75	93.00		
Subscale scores						
Short-term regulation	Yes	352/99.4%	40.69	40.00	267.00	0.55
	No	2/0.5%	38.50	38.50		
Long-term regulation	Yes	352/99.4%	52.79	53.00	386.00	0.81
	No	2/0.5%	54.50	54.50		

Note: The Mann-Whitney U test was used to analyse the effect of perceived internet usage on total/ short-term and long-term self-regulation as the assumption of normality was not met.

Table 7 ASRI scores and relationship with self-perceived internet dependence on total ASRI self-regulation scores (n=354)

Variable	Self-reported / self-perceived internet dependence	Number (%)	Mean±SD	Median	t/ U	P-value
Total ASRI scores	Yes	222/62.7%	92.84±11.22	11.30	251.35	0.19
	No	132/37.2%	94.57± 12.55			
Sub-scale scores						
Short-term regulation	Yes	222/62.7%	40.23±6.07	40.00	16017.50	0.142
	No	132/37.2%	41.43±6.49	40.50		
Long-term regulation	Yes	222/62.7%	52.60±7.30	53.00	15336.00	0.462
	No	132/37.2%	53.13±8.24	54.00		

Note: Welch's test was used to examine the effect of self-reported / self-perceived internet dependence on total self-regulation scores as the Levene's Equality of Variance test was significant.

The Mann-Whitney U test to analyse the effect of self-reported / self-perceived Internet Dependence on short-term and long-term self-regulation as the assumption of normality was not met.

Table 8 ASRI scores and relationship with self-perceived social media usage (n=354)

Variable	Self-reported / self-perceived social media usage	Number (%)	Mean±SD	Median	t/F/U	Df	P-value
Total ASRI scores	Yes	332/93.7%	93.62±11.71	NA	0.83	352	0.40
	No	22/6.2%	91.45±12.38	NA			
Sub-scale scores							
Short-term regulation	Yes	332/93.7%	40.71±6.28	40.00	3622.00	NA	0.94
	No	22/6.2%	40.27±5.84	40.00			
Long-term regulation	Yes	332/93.7%	52.91±7.57	53.00	3083.00	NA	0.22
	No	22/6.2%	51.18±8.91	51.00			

Note: The Mann-Whitney U test was used to analyse the effect of s social media usage on short-term and long-term self-regulation as the assumption of normality was not met.

Table 9 ASRI scores and relationship with self-perceived social media dependence (n=354)

Variable	Self-reported / self-perceived social media dependence	Number (%)	Mean±SD	t	Df	P-value
Total ASRI scores	Yes	108/30.5%	90.935±11.426	2.737	352	**0.007**
	No	246/69.4%	94.614±11.738			
Sub-scale scores						
Short-term regulation	Yes	108/30.5%	39.53±6.15	39.00	15410.00	**0.01**
	No	246/69.4%	41.19±6.23	41.00		
Long-term regulation	Yes	108/30.5%	51.39±8.05	50.00	15394.000	**0.01**
	No	246/69.4%	53.42±7.41	53.50		

p-value* <0.05

Note: The Mann-Whitney UMann-Whitney U Utest was used to analyse the effect of self-reported /self-perceived social media dependence on short-term and long-term self-regulation as the assumption of normality was not met.

Table 10 ASRI scores and relationship with self-perceived assessment of control over one's life on total ASRI self-regulation scores (n=354)

Variable	Self-reported self-perceived assessment of control over one's life	Number (%)	Mean±SD	t/H	Df	P-value
Total ASRI scores	Yes	173/48.8%	95.63±11.31	6.13	2	**0.002**
	No	40/11.29%	92.82±12.26			
	Not Sure	141/39.8%	91.05±11.71			
Sub-scale scores						
Short-term regulation	Yes	173/48.8%	41.561±6.061	6.687	2	**0.03**
	No	40/11.2%	39.850±6.647			
	Not Sure	141/39.8%	39.851±6.259			
Long-term regulation	Yes	173/48.8%	54.069±7.406	11.129	2	**0.004**
	No	40/11.2%	52.975±7.698			
	Not Sure	141/39.8%	51.206±7.715			

p-value* <0.05

Note: A Kruskal-Wallis test was used to analyse the effect of self-reported/ self-perceived assessment of control over one's life on short and long-term self-regulation, as the assumption of normality was not met in one of the groups.

The ASRI total and subscale scores and relationship with sibling status was found to be non-significant, p > 0.001.

The ASRI total and subscale scores and relationship with tobacco consumption was found to be non-significant, p > 0.001.

The ASRI total and subscale scores and relationship with alcohol consumption was found to be non-significant, p > 0.001.

Discussion

Self-regulation becomes more intentional, and adaptive in adolescence compared to the previous stages of development. The neuropsychological change in adolescence provides a great opportunity to develop self-regulation skills. Interventions during this period can be of substantial benefit to young people going into adulthood and society at large.[3] In the present study total, short-term and long-term self-regulation were examined in relation to various demographic variables in late adolescence and young adulthood.

Relationship between age and total ASRI subscores (Table 1)

We did not find a statistically significant difference between the two age groups which (17 to 19 years (M=93.6, SD=11.99 ages 20 to 21 years, (M=93.02, SD=10.90) in the total ASRI scores t (352)

=0.40, p = 0.69. This could be because our sample consisted of students in late adolescence and young adulthood who may have developed self-regulatory skills as compared to younger adolescents. The ASRI scale has subscores for short-term and long-term self-regulation. We did not find a statistically significant difference in long-term self-regulation scores between students aged between 17 to 19 years (M=52.95, SD=7.56) and those aged between 20 to 21 years. (M=52.27, SD=8.00), t (352) =0.69, p = 0.48.

It has been observed that self-regulatory ability is quite developed in the stages of adolescence and young adulthood compared to childhood. Our sample age range covered only late adolescence and young adulthood which may partly explain the non-significant results that were observed.

Relationship between total and subscores of ASRI and sibling status (Table 2)

We did not find a statistically significant difference in total self-regulation scores on the Adolescent Self-Regulatory Inventory (ASRI) and sibling status, F(2,351) = 0.08, p = 0.92, η²p=4.590×10-4. A significant effect of sibling status was found on the short-term regulation score on the ASRI, H (2) = 1.79, p =0.40 and in long-term self-regulation scores on ASRI, F (2,351) = 0.14, p = 0.86, η²p=8.122×10-. Participants without any siblings had higher overall self-regulation and short-term self-regulation scores compared to those with one or more than one sibling.

Siblings provide a unique opportunity to practice social skills and learn behaviours. Sibling affection is negatively linked to externalizing behaviours during early adolescence and promotes self-regulation.[4] In the current study we did not find any link between sibling status and self-regulation, maybe because the age range of our sample falls within that of typical college-going undergraduate to postgraduate students, who tend to be more closely associated with their peer groups compared to siblings during this developmental period, where the focus is on identity exploration and formation.

Relationship between total and subscores of ASRI and academic Courses (Table 3)

We did not find a statistically significant difference in total self-regulation scores on ASRI and student's courses, F (2,351) = 1.27, p = 0.28, η²p=0.007. A significant effect of student's course on short-term regulation scores of the Adolescent Self-Regulatory Inventory (ASRI) was found, H (2) = 6.35, P <.05. A Post-hoc Dunn's test showed a significant difference between students who were enrolled in the B.Com and B.Sc courses (P=.05), and B.Sc and BA courses (P<.05), respectively, compared to those enrolled in the B.Com and BA courses (P>.05). No statistically significant difference in long-term self-regulation scores on the Adolescent Self-Regulatory Inventory (ASRI) were found, F (2,351) = 0.26, p = 0.76, η²p=0.002 Efficient self-regulation skills help college students to navigate an increasingly complex society.[20] Higher self-regulation is linked to better academic performance.[6] STEM students show greater levels of self-regulation compared to non-STEM students.[7] As STEM programs are typically more high pressure compared to non-STEM programs, self-regulation may be an outcome of being enrolled in a STEM program rather than a prerequisite.[21] One study found similar results to our study, where STEM-students had lower levels of self-regulation compared to non-STEM students.[22] We found a significant difference between short-term self-regulation and academic courses. The mean scores for self-regulation for science students were lower compared to that of Commerce and Arts students, this can be due to the fact that the Indian educational system tends to put undue pressure on students pursuing science.

Relationship between total and subscores of ASRI and participation in Inter school/ college sports competitions (Table 4)

We found no significant difference in total ASRI scores between students who participated in interschool and college sports competitions (M=94.07, SD=13.33) and those who did not (M=93.38, SD= 11.45), t (352) = -0.39, p = 0.69. However, the total self-regulation scores were higher in college students who took part in these extra-curricular activities. Similarly, there was no statistically significant difference found between the long-term regulation subscores between those who took part in these competitions (M=52.94, SD=8.81) and those who did not (M=52.77, SD=7.44), t (68.88) = -0.13, p = 0.89 and short-term self-regulation subscores of those who took part in competitions (Mdn=40.00) and those who did not (Mdn=40.00), U=7827.00, p=0.57.

In our previous study,[6] we studied the aforementioned scale scores in relation to participation in athletic and non-athletic intercollegiate competitions. It was found that females who participated in athletic and non-athletic inter-collegiate competitions scored higher on social self-efficacy and self-regulation than non-participants.

Relationship between Total and Subscores of ASRI and participation in other inter school/ college competitions (Table 5)

We found no significant difference in total self-regulation scores between students who participated in interschool and college competitions (M=94.50, SD=11.44) and those who did not (M=93.02, SD= 11.88), t (352) =1.09, p = 0.27. Similar results were found for short-term self-regulation scores between students who participated in other interschool/college competitions (Mdn=40.00) and those who did not (Mdn=40.00), U=12568.50, p=0.30 and long-term self-regulation scores between students who participated in other interschool/college competitions (M=53.50, SD=7.67) and those who did not (M=52.48, SD=7.64), t (352) = -1.16, p = 0.24. Sports are an excellent opportunity for students to develop self-regulation skills. Self-regulation of learning is the extent to which a person engages in his/her learning process in order to improve performance at a specific task. It is considered a crucial psychological skill in the world of sports.[23] In the present study we did not find any significant results.

A study found differences between elite and non-elite athletes who played football in the subcomponents of self-regulation of learning.[24] In the current study we did not find any significant association between self-regulation and sports possibly because we did not differentiate between skill or experience level, type of sport played, team-sports versus individual sports.

Relationship between total and subscores of ASRI scores and perceived internet usage (Table 6)

We found no significant difference between, total self-regulation scores between students who used the internet (Mdn=93.00) and those who did not (Mdn=93.00), U=344.50, p=0.96. Similar results were found for short-term self-regulation scores between students who used the internet (Mdn=40.00) compared to those who did not (Mdn=38.50), U=267.00, p=0.55, and long-term self-regulation scores between students who used the internet (Mdn=53.00) compared to those who did not (Mdn=54.50), U=386.00, p=0.81.

Internet usage when problematic can affect both mental and physical health negatively.[25] We did not find any significant results between perceived internet usage and self-regulation, possibly because

usage was reported based on participants self-perception, which could have been rated lower than a rating that would have been given by a third person. Another reason could be that we were looking at regular usage in this context without specifying a threshold for defining how much would be considered the norm.

Relationship between total and subscores of ASRI and self-perceived internet dependence (Table 7)

We found no significant difference in total self-regulation scores between students who perceived themselves as being dependent on the internet (M=92.84, SD=11.22) and those who did not (M=94.57, SD=12.55), t(0.19) =1.30, p = 0.19. Similar results were found for short-term self-regulation scores between students who perceived themselves as being dependent on the internet (Mdn=40.00) compared to those who did not (Mdn=40.50), U=16017.50, p=0.14; and long-term self-regulation scores between students who perceived themselves as being dependent on the internet (Mdn=53.00) compared to those who did not (Mdn=54.00), U=15336.00 p=0.46.

Problematic internet usage (PIU) or internet addiction is the inability to control one's internet usage. One of the reasons for this is considered to be poor self-regulation capacities, such as high impulsivity and low inhibitory control.[26] Internet usage is highly variable. An Indian study found that around 20% to 40% college students are at risk of developing an internet addiction, with an overall prevalence rate of close to 40.7%.[27] Another Indian study examined smartphone usage patterns in adolescents and young adults, found that females made use of their smartphones in a judicious manner and were less likely to use their phones as a distraction. Most female users made use of apps that were for music or educational purposes suggesting an overall functional usage for purposes such as emergencies, communication etc.[28]

Female students are reported to have better communication skills than males and were more likely to report use of the internet for mood regulation.[28] This use of the internet for mood regulation may also contribute to better self-regulation skills in females overall, which may explain the lack of significant results in the present study.

Relationship between total and subscores of ASRI and self-perceived social media usage (Table 8)

We found no significant difference in total self-regulation scores between students who used social media (M=93.62, SD=11.71) and those who did not (M=91.45, SD=12.38), t (352) =0.83, p = 0.40. Similar results were found for short-term self-regulation scores between students who used social media (Mdn=40.00) compared to those who did not (Mdn= 40.00), U=3622.00, p=0.94; and long-term self-regulation scores between students who used social media (Mdn=53.00) compared to those who did not (Mdn=51.00), U=3083.00, p=0.22.

Relationship between total and subscores of ASRI and self-perceived social media dependence (Table 9)

We found a significant difference in total self-regulation scores between students who perceived themselves as being dependent on social media (M= 90.93, SD= 11.42) and those who did not (M=94.61, SD=11.73), t (352) =2.73, p= 0.007. Similar results were found for short-term self-regulation scores between students who perceived themselves as being dependent on social media (Mdn=39.00) compared to those who did not (Mdn=41.00), U=15410.00, p=0.01; and long-term self-regulation scores between students who perceived themselves as being dependent on social media (Mdn=50.00) compared to those who did not (Mdn=53.00), U=15394.00, p=0.01.

Students who perceived themselves are being dependent on social media had lower mean short-term and long-term self-regulation scores. The average social media user spends close to 2 hours and 25 minutes on social media on a daily basis, which is more than the average time taken to perform other activities of living, such as eating etc.[29] Individuals who used social media excessively showed a psychological imbalance between the impulsive and reflective systems in their mind. Greater amounts of self-control indicate a judicious use of social media, while at the same time overuse of social media affects psychological wellbeing negatively, leading to loneliness, depression, low self-esteem and behavioural concerns.[29] Using Facebook for passing time, entertainment and communication were found to play a role in addiction in females aged 19 to 21 years.[30] Self-regulation can help distinguish between problematic and non-problematic social media use.[31,32]

Most scholars consider an excessive usage of social media to be using it from one to over five hours in a day. Any behavioural excess is considered to be an impulse control failure. Students who are undergoing mental health crises tend to excessively use social media as a coping method to distract themselves from their struggles, which again indicates deficient self-regulatory capacity. Excessive use of both the internet and social media are caused by an inconsistency between the user's conscious attitude and behaviour.[29] Adolescents who can regulate social media usage have less chances of developing a problematic social media use (PSMU).[33] An Indian study found that female students rarely chat with their friends on Facebook, or post status updates, indicating a more recreational usage pattern, which may explain the insignificant results in this domain. Since female students are not overly active on social media, it may be indicative of healthy self-regulation.[34]

Relationship between total and subscores of ASRI and tobacco consumption and alcohol consumption

No significant differences were found in total self-regulation scores between students who consumed tobacco (M=90.66, SD= 11.01) compared to those who did not (M=93.51, SD= 11.76), t (352) =0.418, p = 0.676. Participants who consumed tobacco had overall lower mean self-regulation scores compared to those who did not. Similar results were found for short-term self-regulation scores between students who consumed tobacco (Mdn=40.00) compared to those who did not (Mdn=40.00), U=586.00, p=0.73; and long-term self-regulation scores between students who consumed tobacco (Mdn=50.00) compared to those who did not (Mdn=53.00), U=601.50, p=0.67.

No significant differences were found in total self-regulation scores between students who consumed alcohol (M=94.50, SD=93.60) compared to those who did not (M=93.48, SD= 11.85), t(352) =0.03, p = 0.97. Similar results were found for short-term self-regulation scores between students who consumed alcohol (Mdn= 39.00) compared to those who did not (Mdn= 40.00), U=2004.50, p=0.373; and long-term self-regulation scores between students who consumed alcohol (Mdn= 55.50) compared to those who did not (Mdn= 53.00), U=1456.50, p=0.409.

Self-regulation plays a critical role in adaptive and maladaptive behaviours.[35] Self-regulation skills include executive functions, controlled attention etc. In the current study we did not make differentiations based on the types of self-regulation, apart from short-term or long-term self-regulation which may indicate why we did not get any significant findings. In a study which made use of a revised version of the ASRI, (ASRI-2r), and included mostly female participants aged between 10 to 20 years, the researchers attempted

to examine the relationship between self-regulation and substance use, they found a link between gender and long-term self-regulation, which was higher in the female participants. They also found that young people who used substances scored lower for long-term self-regulation.[35]

Self-regulation involves the ability to delay gratification. Low-levels of self-regulation have been linked to high levels of alcohol-related consequences.[36] We did not find any significant results between alcohol consumption and self-regulation in the present study, this could be because using alcohol is not necessarily indicative of low self-regulation.[36] We also did not take into consideration the amount of consumption, which may have led to the lack of significant results.

When it comes to the association between self-regulation and alcohol use among college students, there have been instances when no relationship could be established between the two. One of the reasons for this could also be the self-report format which may have been influenced by underreporting.[35,36]

Relationship between total and subscores of ASRI and self-perceived assessment of control over one's life (Table 10)

We found a statistically significant difference in total self-regulation scores on the Adolescent Self-Regulatory Inventory (ASRI) between at least two groups, $F_{(2, 351)} = 6.130$, $p = 0.002$, $\eta^2 p = 0.034$. There was a significant difference between students who perceived themselves as being in control of their life (i.e., those who answered "Yes") (M= 95.63, SD=11.31), and those who perceived themselves as not being sure if they were in control of their life (i.e., those who answered "Not Sure") (M= 91.05, SD=11.71), p = 0.002.

There was no statistically significant difference between those who did not perceive themselves as being in control of their life (i.e., those who answered "No") (M= 92.82, SD=12.26) and who perceived themselves as being in control of their life (i.e., those who answered "Yes") (M= 95.63, SD=11.31), p = 0.352. Similar results were found for those who did not perceive themselves as being in control of their life (i.e., those who answered "No") (M= 92.82 ,SD=12.26)and those who perceived themselves as not being sure if they were in control of their life (i.e., those who answered "Not Sure") (M= 91.05,SD=11.71), p = 0.67.

There was a significant effect of perceived control over one's life on ASRI scores H (2) = 6.68, P <.05. A Post hoc Dunn's test showed that those who perceived themselves as being sure (Yes) and not sure had significant scores (P<.05) compared to those who perceived themselves as not being in control of their life. There was a significant effect of perceived control over one's life on ASRI scores H (2) = 11.12, P <.05. A Post hoc Dunn's test showed that those who perceived themselves as being sure (Yes) and not sure had significant scores (P<.05) compared to those who perceived themselves as not being in control of their life.

Perceived control is a belief and capacity that one possesses to act on and achieve outcomes that are desirable and has many adaptive benefits. It is linked to psychological well-being, reducing the impact of stressors and increasing one's ability to cope. It also aids in making behaviour changes that may be challenging. Having a sense of control is a predictor for healthy behaviours as well.[22] When people believe that they have an impact over their own lives, they take action towards corrective steps to improve themselves, physically or mentally.[22]

Aiming for excellence is a common theme in the life of a college undergraduate.[37] The responsibility for academic success increases as students advance within the education system. Perceived control is closely tied to achievement and has been associated with college success.[38] Students who believe that they are in control of their learning would be more likely to take initiative, compared to those who do not, leading to underachievement and even dropping out of the course. In a study of mostly female 1st year college students, between 17 to 22 years, it was found that perceived control had a greater impact than self-esteem on academic achievement.[38]

In the current study there was a difference between students who perceived themselves as being certain of being in control of their lives compared to those who were unsure with respect to overall self-regulation. There was a difference between those who were certain or not sure if they were in control of their lives with respect to short-term regulation. We also found similar results for long-term self-regulation scores as well. It may be that those who believe in their power to be in control, are also able to self-regulate themselves better based on this belief system they have, compared to students who do not believe that this is within their control, making them more resilient in the face of challenges.

Individuals who have high levels of desire to be in control, are more likely to behave like it and take initiative for themselves, whereas those with lower levels of desire to be in control would adopt a more passive behavioural approach.[22,38] Perceived control plays a role in overcoming failures associated with early adulthood. It was found to be significantly linked to subjective well-being. Among young adults, it was also associated with fewer experiences of negative emotions, which was not observed in older adults. According to researchers this may indicate that perceiving oneself as being in control in life may influence their ability to down-regulate potential experiences that are emotionally negative in nature. The ability to down-regulate may be an indication of healthy self-regulatory abilities, which would play a protective role in dealing with failures.[38]

Other studies using the ASRI have also found that both short and long-term self-regulation play an important role in adolescent or young adult behaviour. Moilanen,[39] using the ASRI found that individuals with higher levels of long-term self-regulation are able to delay sexual gratification due to having enough short-term self-regulation capacity to pursue other goals.[39] It was found that long-term self-regulations skills as scored on the ASRI in adolescents, is a negative predictor for maladaptive cognitive emotion regulation. This also indicates that adolescents who can regulate their emotions for longer periods of time have lower external locus of control and use more adaptive cognitive emotion regulation techniques. Adolescents who used short-term self-regulation skills were observed to have lower levels of adaptive coping, often using catastrophizing, self-blame strategies etc.[40] Bhave et al.,[6] also found that emotional intelligence was positively correlated with short-term and long-term self-regulation in engineering students aged between 17 to 18 years. They also suggested that interventions should target enhancement of self-regulation in adolescents.[6]

In the present study our participants were either in the stages of late adolescence or early adulthood, which means that their self-regulatory ability is already formed to quite a great extent with the passage of time from childhood to these stages. We did not look at possible confounding variables that may have led to individual differences between the two age groups in the context of self-regulation. The labels of late adolescence and adulthood and the age ranges that fall under them are often arbitrarily decided and commonly disputed, which may also have contributed to our findings.

The significant findings from this study may be important as self-regulation skills develop into young adulthood, which is important

in the context of psychological interventions.[3] Many psychiatric illnesses have their onset or prodromal period during adolescence and young adulthood, self-regulation deficits are a common feature in these illnesses. By exploring factors that may be protective in the context of self-regulation we can assist in developing evidence-based programs or approaches that will aid in the strengthening of self-regulation skills.

The period of adolescence is associated with high rates of brain development which makes it a period of great developmental plasticity.[41] There are many ways to teach self-regulation, including modelling, and reinforcing goal achievement. Self-regulation can be a preventive intervention for older adolescents and young adults, with findings showing that interventions focused on various skills such as training one to develop resilience, conflict resolution, anger and stress management skills are all very useful in inducing meaning changes in behaviour.[3]

It is suggested that cognitive, emotional, and behavioural self-regulation can be taught in similar ways to literacy, with coaching and other methods. For young people with problems in self-regulation these interventions can be very useful. Aiding young people in developing self-regulatory skills is important as it is a predictor of better income, lower risk-related behaviours and reduced healthcare expenditure according to some reports.[3] AACCI regularly conducts WHO LSE-Life Skill education programs that help adolescents to develop these skill sets. Overall, our findings suggest that self-perception plays an important role in the self-regulation abilities of college students compared to sociodemographic factors.

Conclusion

Deficits in self-regulation often underline many mental health challenges in late adolescence and early adulthood. However, at the same time this age group also benefits from training that targets the development of self-regulation skills due to developmental plasticity. In this study we found that students who perceived themselves as being in control their life, had greater total ASRI as well as both short and long term ASRI scores and compared to those who weren't sure or did not think they had control, indicating that higher levels of self-regulation may play an important role in life outcomes in this age group. We also found significant differences in the total ASRI scores between those who perceived themselves as being dependent on social media compared to those who were not. AACCI works on empowering adolescents and young adults to develop life skills. Results from this study are used by AACCI to design interventions that specifically target subsets of self-regulation for better psychological wellbeing and positive mental health outcomes later in adulthood.

Limitations

A major limitation was that the sample was a convenience sample, collected from only one college which had only female students. Hence, the generalizability of this sample to the wider population needs more studies that include with both genders and different age groups. This study used self-report measures which are known to have the probability of skewed data due to various individual biases such as wanting to have social desirability and answering with this bias.

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Conflicts of interest

We have no conflict of interests to declare.

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