# Adolescent Gender and Age differences in Self-Regulation

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**Abstract:**

Self-regulation has been regarded as a risk and protective factor for mental health in adolescents. The aim of present research was to explore age and gender related differences in behavioral, emotional and cognitive regulation skills in Pakistani adolescents. A cross-sectional survey research design was used. Convenience sampling was used to collect data from (N=407) adolescents from 11 to 18 years of age from various major cities of Pakistan. Behavior Rating Inventory of Executive Functions (BRIEF) was used to measure self-regulation along with certain demographic characteristics including school type, parents' education, location of home. Results indicated that there were significant age differences in cognitive regulation but not in emotional and behavioral regulation. There were significant gender differences in emotional and behavioral regulation. There were also significant differences in emotional and behavioral regulation between public and private schools. Results holds implication for future intervention and prevention based research.

**Keywords:**

- Emotional regulation, cognitive regulation, behavioral regulation

## 1. Introduction:

Adolescence is a unique and formative phase of life where many physical, emotional, behavioural and cognitive and neurobiological changes are taking place amid a challenging and demanding social world which require effective self-regulatory skills (Leung & Shek,

2019; te Brinke et al., 2021; Verzeletti et al., 2016; Zafar et al., 2021). These neurobiological changes create a window of opportunity to develop and practice effective executive functions underlying self-regulation to promote mental health and psychosocial strengths in adolescence (Williams et al., 2023).

Effective self-regulation has been linked with positive outcomes in various domains including academic, intrapersonal, and interpersonal (Farley, Julee & Kim-Spoon, 2014; Gestsdottir et al., 2011; Murray & Rosanbalm, 2017). Adolescents are expected to manage their emotions and behavior in an ever changing social context, to develop and maintain appropriate social ties with family, friends and others, and to perform well in academic and other areas of life within the boundaries of social norms and expectations. All of these psychosocial strengths require effective self-regulatory skills (Bakracevic Vukman & Licardo, 2010; Bowers et al., 2015; Lerner et al., 2021; Stefansson et al., 2018).

Self-regulation is comprised of emotional regulation, behavior regulation, and cognitive regulation. Emotional regulation is defined as a set of processes that serve to modulate, maintain, or enhance the intensity and valence of emotional experiences (Eisenberg et al., 2010a); while behavioral regulation is defined as modulating and directing one's behavior (Ilkowska & Engle, 2010) and cognitive regulation is defined as regulation of one's own thinking processes and focusing one's attention on desirable goals (Santosh et al., 2015).

Given the importance of self-regulation for mental health in adolescents, the present research explored gender and age related differences in behavioral, emotional and cognitive regulation in Pakistan. A secondary aim was to explores how school and parent education is related to self-regulatory differences in adolescents.

## 2. Literature Review:

Emotional regulation has been regarded as a trans-diagnostic risk factor for externalizing as well as internalizing problems including conduct related disorders, anxiety related disorders and depression (Aldao, 2016). A recent meta-analysis on self-regulation intervention effectiveness in early adolescence indicated emotional regulation as the most critical component for improving emotional and behavioural outcomes (

Murray et al., 2022).  Effective emotional regulation is linked with interpersonal effectiveness in close relationships (Chen & Liao, 2021) and prosocial behavior(Teuber et al., 2022).

A retrospective study on adolescent self-control indicated that self-control remains stable from adolescence to adulthood, and better self-control was linked with good mental health and physical health in adulthood (Yang & Jiang, 2022).  A longitudinal study on adolescent self-control, mental health problems and family functioning indicated that self-control and both internalizing and externalizing problems had moderate concurrent associations (Kim et al., 2022). Moreover, a meta-analysis on self-control indicated that there is a medium effect size of self-control on wellbeing indictors including interpersonal relationships (de Ridder et al., 2012).

These skills are widely studied as predictors of academic performance indicating that effective cognitive regulation predicts good academic performance as compared to other dimensions of self-regulation (Poon, 2017). A study on preschoolers' executive function indicated that deficits in working memory were related positively to inattention problems, and negatively to adaptability and social skills (Romero-López et al., 2018).  Working memory is found to be interfered by anxiety (Lukasik et al., 2019; Moran, 2016; Ward et al., 2020).

Adolescence is a critical developmental period marked not only by significant changes in emotional, cognitive, and behavioral regulation but also by profound neurobiological transformations that shape these regulatory processes. The maturation of the adolescent brain involves substantial structural and functional changes, particularly in regions associated with emotion regulation, such as the prefrontal cortex and the limbic system. Recent studies, like those by Yurgelun-Todd (2007), demonstrate that the prefrontal cortex, which is crucial for decision-making, impulse control, and executive function, continues to develop throughout adolescence, influencing cognitive control and behavioral regulation capacities. Meanwhile, the amygdala, a brain region implicated in emotional processing, undergoes changes that can heighten emotional reactivity, especially in the face of social or stressful stimuli.

These neurobiological developments contribute to age-related differences in emotional and behavioral regulation observed during adolescence. For instance, research by Deng et al. (2019) reveals age-related differences in the late positive potential during emotion regulation tasks, suggesting that maturation of neural circuits contributes to adolescents' varying abilities to manage emotions effectively. Additionally, Cohen Kadosh et al. (2014) highlight that ongoing maturation of attentional control mechanisms within the prefrontal cortex directly impacts adolescents' emotion regulation capacities, making younger adolescents particularly vulnerable to emotional dysregulation and associated mental health issues, such as anxiety and depression.

Existing literature has pointed out to the significant age and gender differences in mental health of adolescents(Cilar Budler & Stiglic, 2023; Luijten et al., 2021; Yoon et al., 2023). These differences might be partially explained due to the gender and age related differences in self-regulation which is a significant factor impacting mental health (Chervonsky & Hunt, 2019; Kim et al., 2022). For example, a study on adolescents emotional regulation and psychopathology indicated that adolescents with internalizing problems used more cognitive regulation and adolescents with externalizing problems used more behavioral regulation strategies. This study also highlighted the multimodal nature of emotional regulation which is often neglected in the studies (te Brinke et al., 2021). Another study indicated that poor working memory which is part of cognitive regulation was a significant predictor for externalizing problems and general psychopathology but not a significant predictor for internalizing problems (Huang-Pollock et al., 2017). A study on age and gender differences indicated that early adolescents and pre-adolescents had lower scores on emotional regulation as compared to middle adolescents (13 to 16 years old). Girls reported to use high emotional regulation strategies than boys when they experienced psychological distress (Sanchis-Sanchis et al., 2020). A study on Pakistani adolescent indicated that emotional regulation is a significant predictor of various psychopathologies for girls and boys and there are significant gender differences across this association (Zafar et al., 2021).

Previous literature has also indicated that rural context has a detrimental impact on cognitive development of adolescents due to a number of specific factors in rural settings including years of fathers education, number of siblings, and past preschool attendance (Hermida et al., 2018).

In the light of exiting literature, the present study explored gender and age related differences in three types of self-regulation emotional, behavioral and cognitive. Secondly it was explored whether there are differences in emotional, cognitive and behavioral regulation according to the location of home, school type and level of parents' education.

## 3. Methodology:

### Research Design

A cross sectional survey research design was used.

### Participants

Convenience sampling was used to collect data from 11 to 18 years old adolescents from major cities of Pakistan including Islamabad, Rawalpindi, Lahore, Swat, and Quetta. The mean age was 15.08 (2.04) with a slight high number of girls (54%). Majority of participants were in private schools (57%). Half of the participants were from nuclear family (54%). Roughly a quarter of parents (36%) had 6 to 10 years of education and 35% had 11 to 14 years of education. Less than a quarter of parents had a master degree (15%).

### Scales

### Behavior Rating Inventory of Executive Functions

It is a 55 items 3 point Likert self-report scale to measure self-regulation and its three subdomains i.e. Behavior Regulation Index (BRI), Emotional Regulation Index (ERI) and Cognitive Regulation Index (CRI). There are seven clinical subscales, namely inhibit and, self-monitor comprising BRI; shift and emotional control comprising ERI, and task completion, working memory and plan/organize making CRI. The scale had good reliability estimates for subscales and overall scale ranging from .72, .75 and .86 in the present study. High scores mean ineffective self-regulation, and lower scores mean effective self-regulation. This scale was translated in Urdu using WHO translation guidelines(World Health Organization, 2010).

### Procedure

Ethical approval was taken from the IRB of university. Participants were approached in academies, tuition centers and through social networks. Informed consent was taken from parents and assent was taken from adolescents to participate in the study. Questionnaire was given to the adolescents to either fill at homes or at tuition center. Any question from participants was addressed. No rumination was given for the participation in the study.

## 3. Results

**Table 1**

*Descriptives of Self-Regulation (N=407)*

| Variables | α | No. of Items | Potential Range | Actual Range | M | SD | Skew | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| Behavior Regulation | .72 | 13 | 13-39 | 12-35 | 22.60 | 0.22 | 0.05 | -0.60 |
| Emotional Regulation | .75 | 14 | 14-42 | 14-37 | 24.91 | 0.24 | -0.05 | -0.36 |
| Cognitive Regulation | .86 | 23 | 23-69 | 23-59 | 38.65 | 0.39 | 0.12 | -0.43 |

Correlation analyses indicated a significant positive correlation between behavioral, emotional and cognitive regulation ranging from .63** to .74**.

**Table 2**

*Mean differences in Self-Regulation in Boys and Girls*

| . | Boys (n=189) | | Girls (n=218) | | $t$ | $p$ | $d$ |
|---|---|---|---|---|---|---|---|
| **Variables** | M | SD | M | SD | | | |
| Behavior Regulation | 22.02 | 4.74 | 23.11 | 4.30 | -2.43 | 0.015 | 0.24 |
| Emotional Regulation | 23.98 | 4.99 | 25.72 | 4.51 | -3.70 | 0.000 | 0.36 |
| Cognitive Regulation | 38.09 | 8.14 | 39.14 | 7.47 | -1.35 | 0.177 | - |

**Table 3**

*Age Related Differences in Adolescent Self-Regulation*

| | 1 (n=139) | | 2 (n=162) | | 3 (n=106) | | $F$ | $p$ |
|---|---|---|---|---|---|---|---|---|
| **Variables** | M | SD | M | SD | M | SD | | |
| Behavior Regulation | 22.65 | 4.69 | 22.07 | 4.57 | 23.35 | 4.144 | 2.53 | 0.08 |
| Emotional Regulation | 24.51 | 4.95 | 24.77 | 5.02 | 25.63 | 4.212 | 1.73 | 0.18 |
| Cognitive Regulation | 37.49 | 7.67 | 38.43 | 7.71 | 40.44 | 7.717 | 4.48 | 0.01 |

Note.1= Early adolescents 11 to 14, 2=Middle Adolescents= 11 and 15 years , 3= Late adolescents 17 and 18 years

**Table 4**

*Parents Education related Differences in Adolescent Self-Regulation*

| . | 0-5 years (n= | | 6-10 years | | 11-14 years | | 15-16 years | | 17& above years | | *F* | *p* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Variables** | M | SD | M | SD | M | SD | M | SD | M | SD | | |
| Behavior Regulation | 25.12 | 4.52 | 22.53 | 4.43 | 22.33 | 4.65 | 22.59 | 4.31 | 25.88 | 2.90 | 2.34 | 0.05 |
| Emotional Regulation | 25.57 | 4.40 | 24.65 | 4.43 | 24.73 | 5.34 | 25.17 | 4.47 | 27.75 | 2.82 | 0.99 | 0.41 |
| Cognitive Regulation | 41.03 | 9.76 | 37.94 | 6.66 | 38.33 | 8.57 | 39.11 | 7.27 | 42.88 | 6.22 | 1.31 | 0.26 |

**Table 5**

*Mean Differences in Adolescent Self-Regulation in Public and Private Schools*

| . | Public School (n=175) | | Private School (n=232) | | *t* | *p* | *d* |
|---|---|---|---|---|---|---|---|
| **Variables** | M | SD | M | SD | | | |
| Behavior Regulation | 23.19 | 4.64 | 21.91 | 4.31 | 2.88 | 0.004 | 0.28 |
| Emotional Regulation | 25.55 | 4.67 | 24.15 | 4.88 | 2.94 | 0.004 | 0.29 |
| Cognitive Regulation | 39.10 | 7.89 | 38.11 | 7.67 | 1.28 | 0.201 | - |

## 5. Discussion:

Descriptives indicated that data is normally distributed and BRIEF Urdu scale has adequate reliability estimates. There was a significant positive correlation between emotional, cognitive and behavioral regulation. T-test result indicated that there was a significant mean difference in emotional and behavioral regulation between boys and girls in such a way that girls had poor emotional and behavioral regulation as compared to boys. The effect size of differences in emotional regulation was moderate the effect size of differences in behavioral regulation was small. This result is inconsistent with previous studies indicating no gender differences in self-regulation or better self-regulation in girls. A previous study on adolescent self-regulation indicated that middle age girls perceived their emotional regulation and behavioral regulation as compared to males(Tetering et al., 2020) but there was no significant differences in early and late adolescents groups. A longitudinal study also indicated no significant gender differences in overall self-regulation(Kia-Keating et al., 2018).

The result of ANOVA indicated that there are significant age differences in cognitive regulation while non-significant differences in emotional and behavioral regulation across early, middle and late adolescents in such a way that early adolescents have better cognitive regulation than late adolescents (*i-j*= -2.95, p=.010). This finding is consistent with the previous literature indicating non-significant age related differences in emotional regulation strategies in an experimental study(Theurel & Gentaz, 2018). Other studies indicated similar results that self-regulatory abilities remained stable across although but different aspects of cognitive control matured along different developmental trajectories(Magar et al., 2010).

ANOVA across parents' education group indicated there were no statistical significant mean differences in emotional, behavioral and cognitive regulation of adolescents due to their parents' education. This could be due to limited sample size in various subcategories of parents education level. A previous study indicated that father education was a significant predictor for self-regulation in rural setting preschool children(Hermida et al., 2018).

T-tests between public and private schools indicated that there were significant mean differences in emotional and behavioral regulation in such a way that adolescents in private schools had better emotional and behavioral regulation as compared to those reading in public schools. The effect size was near to moderate.

**Limitations and Suggestions**

Present research only used self-reported questionnaire to measure self-regulation in adolescents. In the future it might be worth informing to include performance based tasks to measure self-regulation in real time. Present research did not find out statistical significant difference due to parents' education although parent education is an important indicator impacting adolescents' self-regulation. One of the reason could be that there were not enough members in each group to gauge significance. In future more robust methods can be employed to analyze the impact of parents' education on adolescent self-regulation. For example, taking equal number of sample size in each group and using mixed method studies.

**6. Conclusion:**

The aim of the present research was to analyze demographic related differences in adolescent self-regulation as it is an important indicator for mental health. It can be concluded that self-

regulation is impacted by various social and individual factors including age, gender, and school type. Girls and adolescents from public schools were prone to have poor emotional and behavioral regulation. In terms of prevention and intervention, girls and adolescents from public schools require attention.

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