Becoming Aware of One's Own Biases in Emerging Adulthood—A Longitudinal Study. Metacognitive Approach

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ABSTRACT

The current longitudinal developmental study was designed to determine whether awareness of one's own biases (the metacognitive self, MCS) emerges and develops during the developmental period known as emerging adulthood. To this end, we followed almost 400 undergraduate university students (18–23 years) over the first three years of their studies, capturing data at five time points. We observed a growth in MCS that we explain in terms of the cognitive and motivational processes characteristic of emerging adulthood. We also observed group differences in MCS development. Students who performed better on the MCS scale at the very beginning of the study tended to show a greater increase in the MCS than those who scored poorly. Emerging adulthood appears to be a very important period with respect to individual differences in becoming aware of one's own biases.

KEYWORDS

metacognition
self
growth
emerging adulthood
longitudinal studies

INTRODUCTION

Metacognition and the Metacognitive Self

Metacognition is an important research topic in many fields of psychology, such as neurocognition (Davies, Fowler, & Greenwood, 2017), working memory (van den Berg, Yoo, & Ma, 2017), schizophrenia (Bob, Pec, Mishara, Touskova, & Lysaker, 2016), judgements (Undorf & Zander, 2017), decision-making (Parker & Fischhoff, 2005), children's cognitive development (Flavell, 1979; Swanson, 1990), problem solving (Kontos & Nicholas, 1986), learning (McCormick, 2003), critical thinking processes (Juvonen, 2018; Knifsend & Juvonen, 2014; Takana & Kusumi, 2007), consciousness and memory (Koriat, 2007), and many others (e.g., Schwarz, 2015). In most of these studies, including the developmental ones, metacognition is understood as the "cognition about cognitive phenomena" (Flavell, 1979, p. 906).

We were interested in the interplay between metacognitive thinking about the self and the awareness of own cognitive biases. The term *metacognitive self* (MCS) thus denotes self-awareness of biases. However, the MCS does not pertain to all the known cognitive biases. It is recognized nowadays that some biases play self-regulatory roles. The MCS refers specifically to self-awareness of self-regulatory biases.

Biases are understood as common rules of thinking—the so-called *psychological rules of behaviour* (Larrik, 2004). For example, people tend to overestimate the probability of their future success (Koriat,

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2016; Weiner, 2014) and underestimate the time required to achieve a goal or accomplish a task (Buehler, Griffien, & Ross, 1994). This is because they tend to ignore potential obstacles and are focused on factors that might bring forth success. Thus, biases foster goal pursuit. Many biases that are anchored in heuristics (Kahneman & Tversky, 1973; Weiner, 1972) promote adaptive decision-making. For example, being familiar with an object allows people to make accurate guesses about it (Goldstein & Gigerenzer, 2002). Memory biases contribute to individual differences in pain self-efficacy (Ruben, Jodoin, Hall, & Blach-Hartigan, 2018). Researchers in the area of health psychology also offer other empirical evidence on the self-regulatory role of some perception biases (for heart failure, see Siennicka, Stromberg, Banasiak, Ponikowski, & Jankowska, 2015; for eating disorders, see Dutt, Keyte, Egan, Hussain, & Mantzios, 2019). Moreover, it is impossible to imagine good social interactions and prosocial activity taking place without the reciprocity rule, which is often referred to as social glue (Cialdini, 1993). The reciprocity rule can be regarded as a kind of bias, as it is not based on rational and logical thinking. In contrast, some biases lead to cruel or antisocial behaviour (e.g., the dehumanisation effect) while others disrupt cognition, perception, and memory. Lewandowsky, Ecker, Seifert, and Schwarz (2012) provide a good demonstration of the spread of misinformation (e.g., that vaccination is linked to autism) via media, fiction, rumours, and so on. They claim that reliance on misinformation differs from ignorance, which is the absence of relevant knowledge, and set out the societal costs of misinformation. They also demonstrate that it is difficult to "debias" people's attitudes. They suggest that rebuttal of misinformation is successful under conditions of active monitoring of the context, which facilitates referring to other sources and even healthy skepticism (Lewandowsky et al., 2012). This points to the crucial role of self-awareness in knowledge acquisition.

The MCS amounts to awareness of one's own regulatory biases (Brycz & Karasiewicz, 2011; Konarski & Brycz, 2017). Self-regulatory biases, which constitute the MCS, were extracted by experts from of a list of 129 different biases and psychological rules (Brycz, 2012). Self-regulatory biases include the above-mentioned tendency to overestimate the probability of one's future success (Weinstein, 1980). In short, these are biases that help individuals to undertake social and cognitive activity and pursue their goals, that is, they have a positive impact on human functioning (Taylor & Brown, 1988). We believe that a strong MCS, that is, a good understanding of one's own regulatory biases, might serve a motivational role. Previous studies have shown that the MCS serves self-regulatory functions (Brycz, Jurek, Wojciechowska, Peplinska, & Bidzan 2014; Brycz, Wyszomirska-Gora, Konarski, & Wojciszke, 2018; Konarski & Brycz, 2017).

We were also interested in the processes through which an individual develops a strong MCS. We believe the MCS itself is closely related to motivational and cognitive processes. For instance, the need to acquire accurate knowledge about one's biases may result in metacognitive knowledge about the self. Low need to acquire knowledge about one's biases would likely be associated with a weak metacognitive self, whereas a high need may contribute to the development of a strong MCS. Thus, the strength of one's MCS might depend on one's motivation to achieve insight into one's self-regulatory biases and psychological rules of behaviour. The need to acquire accurate information about one's self is assumed to be rooted in the epistemic need (Kruglanski, 1989) and indicates intrinsic motivation (Higgins & Kruglanski, 2000). A strong MCS thus requires cognitive capacity and a strong motivation to learn about oneself.

Interestingly, individuals with a strong MCS, who have good insight into their self-regulatory biases, exhibit more of these biases in their behaviour than their weak MCS counterparts. It seems that strong MCS people are motivated to acquire self-knowledge and have the wisdom not to correct the biases that affect their self-regulation (Bar-Tal, Brycz, Dolinski, & Dolinska, 2017). Research shows that debiasing strategies are not effective in this case (e.g., the backfire effect; Sanna & Schwarz, 2006; Schwarz, 2015). Other researchers have provided evidence of humans' ability to correct biases (e.g., the flexible correction model; Wegener & Petty, 1995). Human debiasing or bias correction strategies may be linked to many factors, including MCS strength. To sum up, we emphasise the cognitive-motivational basis of the MCS as part of the self-digest—the strong, well-elaborated self, containing self-monitoring, self-expectancy, and self-regulatory modes. Individuals with strong self-digest are able to go beyond the hedonic principle and follow the promotion and prevention focus (Higgins, 1996).

Why Should the Metacognitive Self Increase in Strength During Emerging Adulthood?

The psychological literature on metacognition and learning (e.g., Koriat, Ackerman, Adiv, Lockl, & Schneider, 2014; Yang & Shanks, 2018) indicates that fifth- and sixth-grade students' judgements of learning (JoL, knowing what one knows, which helps to guide self- paced study during acquisition) exhibit sensitivity to data-driven variation in time needed to study, although learners may not be aware of their reliance on the memorizing effort heuristic (i.e., making recall predictions based on study effort). Hatten et al. (2007) and Castel et al. (2011) claimed that learning efficiency score, that is, mathematically derived measure of how quickly people learn information (e.g., words) and how long they remember it, increased monotonically with age (up to 18 year of age). Theorists of self-regulated learning (SRL) have also emphasised that both metacognitive skills (e.g., monitoring, planning, assessing) and student motivation (dispositions, goals, beliefs) interact to influence the outcome of learning (Boekaerts & Corno, 2005; Zimmerman & Schunk, 2001; Zimmerman, 2011). Middle-class, eighth-grade students were shown to be motivated and to possess metacognitive skills. Zepeda, Richey, Ronevich, and Nokes-Malach (2015) specified the conditions under which metacognitive skills might be observed in adolescents. They carried out an elegant Self-regulated Learning-based experiment. Half of their sample of middle school students underwent a metacognitive intervention whilst the other half served as controls. The experimental group lost their overconfidence whereas the control group did not, but the intervention did not increase the middle school students' reported use of planning, monitoring, and evaluation (metacognitive skills) one week after the intervention.

The studies described above provide evidence that metacognition is subject to age-related development and can also be influenced by metacognitive training. However, all of these studies have examined metacognition in children or adolescents. We believe there are good reasons to study metacognition during the transition from adolescence to early adulthood, that is, *emerging adulthood* (18 years to the mid-20s). This is a period of life during which young people are negotiating new and challenging developmental tasks, and it is characterised by the exploration of one's identity, instability, self-centredness, a sense of being in between life stages, and a sense of opportunity (Arnett, 2005). There are improvements in executive function and self-understanding as well as an increase in cognitive complexity during this period (e.g., King & Kitchener, 2015). This means that metacognitive knowledge and the strength of the MCS may also increase during this period. Indeed, in one of the very few studies to examine metacognition in emerging adults, Vukman (2005) found that there are stage changes in both relativistic/dialectical thinking and accuracy of detecting problem-solving strategies in emerging adulthood. Vukman (2005) concluded that "the largest gap in solving everyday life problems is between adolescence and young adulthood even though the smallest age difference is between these two groups" (p. 217). This gap may arise because self-reflection becomes more focused and accurate during emerging adulthood. Hence, we decided to examine the development of the MCS in students aged 19-21 years, by following them over three years of their university studies.

Another important reason for studying emerging adults is that these individuals are increasingly exposed to various health risks related to the modern lifestyle as well as to increased vulnerability and tendency towards risk behaviours typical of this age period (e.g., Arnett, Žukauskienė, & Sugimura, 2014; Jankowska et al., 2017). In turn, metacognition has been shown to predict symptoms of mental health conditions such as depression, psychosis, and obsessive-compulsive disorder (e.g., Morrison, French, & Wells, 2007; Roussis & Wells, 2006; Spada, Nikčević, Moneta, & Wells, 2008). Ashouri, Vakili, Ben-Saeed, and Noei (2009) indicated that metacognitive beliefs are one of the most important factors in general health. Given the importance of metacognition for health, the findings of the present study may carry implications for conceptualizations of healthy development in emerging adulthood.

It should be noted that, until now, most empirical studies have focused on the stable component of the MCS and its self-regulatory functions (e.g., Brycz et al., 2014). Despite this growing body of knowledge, there exists limited data on age-related changes in the MCS. A recent study of a nationally representative sample ($N = 1204$) of 18- to 82-year-olds found that age did not affect the MCS (Brycz & Konarski, 2016). One should not forget, however, that cross-sectional methods provide limited insight into possible developmental changes. Like other personality characteristics, the MCS can be expected to exhibit continuity over time yet change in systematic ways.

Overview of the Study

The objective of the current study was to examine the development of awareness of one's own biases (i.e., the MCS) during the critical life period of emerging adulthood. Both rank-order stability and changes in the mean MCS were investigated at five time points over the three-year period. More specifically, we addressed two basic questions about the MCS development in emerging adulthood. First, what is the trajectory of the MCS during three years of university study? Second, how stable are individual differences in the MCS across this time period? We hypothesised that positive growth in the MCS would be observed over the course of this study, but we did not make a prediction about the longitudinal consistency of inter-individual differences.

METHOD

Participants

The participants were undergraduate students, recruited randomly from the Departments of Humanities and Social Sciences of the University of Gdańsk. Assessments were carried out every six months over the three-year study period, resulting in a total of five assessments. Since some students joined foreign exchange programs, took leave, or failed their examinations and were therefore excluded from the University, we recruited additional students at further stages of the study. The first-assessment (during the summer semester of the first year, March-April 2014) was completed by 438 students (382 women, 38 men). The second assessment (winter semester of the second year, November-December of 2015) was completed by 460 students (410 women, 50 men); this included new students. The third assessment (summer semester of the second year, March-April of 2015) was completed by 441 students (391 women, 50 men) and the fourth assessment (winter semester of the third year, November-December of 2016)—by 423 students (372 women, 51 men). The fifth and final assessment (summer semester of the fourth year, March-April of 2016) was completed by 447 students (396 women, 51 men). The cohort was dominated by women. This was because both the Humanities and Social Sciences departments cover subjects that are more popular with women (Sinology, American Studies, English Studies, German Studies, History of Art, History etc. in the case of the former and Sociology, Education, Philosophy, and Psychology in the case of the latter).

Participants were removed from the database if they had only provided data at the fifth assessment ($n = 1$) or were older than 23 years ($n = 121$). Along all waves of the study, the age of the students ranged from 19 to 23 years ($M = 20.80$, Mdn = 21, $SD = 1.01$). The descriptive statistics on the age of the participants at each assessment are detailed in Table 1. Only students whose data was included in the statistical analyses are included here. As can be seen in Table 1, 329 of the 410 students who participated in the first assessment also participated in the last (fifth) assessment.

Procedure

This was a developmental, longitudinal study. All participants provided written consent to nonanonymous participation: they provided their first name, surname, student ID number, and e-mail address, consented to the conditions of the study, and agreed to attend face-to-face meetings with the interviewers[1]. All undergraduate students who signed

TABLE 1.
Number of Participants in Each Wave of Data Collection Broken Down By Age And MCSQ-21 Scores

Age	Assessment 1	Assessment 2	Assessment 3	Assessment 4	Assessment 5
19	157	12	1	0	0
20	172	271	138	16	2
21	55	100	209	275	163
22	21	27	56	85	184
23	3	11	26	29	52
Total	410	421 (361)	430 (342)	405 (332)	401 (329)
MCS, M (SD)	4.29 (.426)	4.28 (.435)	4.35 (.457)	4.36 (.439)	4.39 (.467)

Note. MCSQ-21 = the Metacognitive Self Questionnaire. The number of participants in parentheses indicates the subset that participated in the first wave.

the consent form were assured that their personal data would remain confidential. They were told they would be asked to attend five assessments over a three-year period. Assessments took place at the end of the semesters, but before end-of-semester examinations. Students participated individually or in groups of up to 30 people. They were informed about the scientific goal of the study. At each assessment, the experimenter asked participants to follow the instructions for the test battery. After answering the demographic questions, they completed the Metacognitive Self Questionnaire (MCSQ-21, Brycz, Konarski, Kleka, & Wright, 2019). We used the paper-and-pencil version. Students were thanked for their participation at each wave of the study. There was no reward for participation.

The effect of age on the MCS score was assessed through mixed model analysis of variance (ANOVA) for repeated measures and the magnitude of the age effect was assessed with the Bland and Altman (1986) method. Bland and Altman (1986) described a method of quantifying the agreement between two quantitative measurements by constructing limits of agreement. These statistical limits are calculated using the mean and the *SD* of the differences between two measurements. Graphs are used to verify the normality of the distribution of differences and other characteristics. The resulting graph (see Figure 2) is an XY scatterplot, plotting the difference of the two paired measurements against the mean of the two measurements. The primary application of the Bland–Altman plot is to compare two measurements, each of which produced some error in their measures. Bland and Altman (1986) recommend that 95% of the data points should lie within 2 *SD*s of the mean difference in order to analyze the agreement of measures and allow for identification of any systematic differences between the measurements or possible outliers. All analyses were calculated in the R environment (R Core Team, 2017).

Measures

The study was conducted using the MCSQ-21 (Brycz et al., 2019), which is a shortened version of the 40-item Metacognitive Self Questionnaire (MCSQ-40; Brycz & Karasiewicz, 2011). The MCSQ-21 was created based on the bi-factor model solution of the MCSQ-40. The items with the lowest factor loadings on the primary metacognitive factor and the highest loadings on the relevant group (functional domain, e.g., memory biases) factor were removed, with the restriction that five substantive functional domains (memory biases, e.g., Item 6: "I remember information better when I can relate it to the knowledge I already have"; attribution biases, e.g., Item 10: "I think that causes are similar to their effects. When I realize that some event such as international conflict is very complex, I think that it was brought by many causes - economic, geopolitical, cultural, etc."; social cognitive laws, community-agency biases, and persuasion laws) should be represented by three items each, and one (i.e., social influence) by six items. Each item of the MCSQ-21 is a colloquial, behavioural description of a given bias. Participants used a six-point Likert scale, ranging from 1 (totally disagree) to 6 (totally agree), to indicate the extent to which they believed each behaviour applied to them. The model-based ω reliability coefficient (McDonald, 1999) for the general MCSQ-21 factor in the calibration sample was .77. This represents a very small decrement in estimated measurement reliability in comparison with the .80 coefficient obtained for the MSCQ-40 in the same sample.

In the present study, the internal consistency of the MCSQ-21 was satisfactory for each sample at each of the five measurements. Cronbach's α (and McDonald's ω) were .681 (.701), .733 (.752), .791 (.806), .760 (.778), and .797 (.811), respectively.

Procedure

To ensure a thorough understanding of the instructions, all participants went through practice trials before the formal experiment. All protocols were identical between the practice and the formal experiment, including one study phase and two test phases (i.e., Recall 1 and Recall 2) in each block, both of which had the testing conditions of item recall together with source retrieval..

RESULTS

We predicted that the MCS would increase during an important developmental transition, namely, emerging adulthood, in which important cognitive and emotional changes occur.

The longitudinal design allowed us to test this hypothesis. During the first two assessments, the MCS score did not exceed 4.30 (*M1* = 4.29, *SD1* = .426; *M2* = 4.28, *SD2* = .435). From the second measurement onward, an increase in the scores was observed (*M5* = 4.39, *SD5* = .467, for details see Figure 1.).

The ANOVA revealed a significant main effect, showing a growth of the MCS, $F(4, 972) = 9.09$, $p < .001$, $\eta^2 = .036$. Two contradictory hypotheses were tested. H1: The growth in MCS is due to maturation during the studied developmental period, thatis, emerging adulthood. H2: The apparent growth in MCS represents a practice effect, that is, students got better at the test because they performed it repeatedly. In order to answer the questions, the cohort was divided into groups on the basis of which assessments have been completed. The groups were defined as follows: Group 11111 ($n = 243$) participated in all assessments, Group 01111 ($n = 38$) missed only the first assessment, Group 10111 ($n = 22$) missed only the second assessment, Group 11011 ($n = 25$) missed only the third assessment, Group 11101 ($n = 18$) missed only the fourth assessment, and Group 11110 ($n = 21$) missed only the fifth assessment. We also distinguished a group of students who joined the study at the third assessment, that is, Group 00111 ($n = 24$), and a group that participated in the first three assessments, that is, Group 11100 ($n = 25$). Ten participants ($n = 10$) were excluded from the above classification as their participation was more sporadic.

The dependent variable of MCS was submitted to mixed ANOVA with study as the within-subject factor and assessment groups as the between-subjects factor. The results indicated that the MCS level was not related to assessment groups, $F(7, 436) = 1.51$, $p = .162$, nor to training, $F(4, 409) = .61$, $p = .656$. It can thus be concluded that the increase in the MCS scores represented a developmental transition rather than a practice effect. Although the observed increase in the MCS level due to emerging adulthood was modest ($d = .23$), the effect was significant, and therefore H1 can be accepted, $F(4, 1419) = 2.62$, $p = .034$).

The distribution of mean scores shown in Figure 1 suggests that, in almost all groups, the MCS strength increased with age rather than with the number of times the questionnaire had been completed. There were two exceptions, namely Groups 11100 and 11101. However, these groups were small ($n = 25$ and $n = 18$, respectively) and thus not representative for the whole cohort.

In addition to examining changes in the mean MCS scores over time, we also examined the rank-order stability of the MCS (i.e., how stable the relative ordering of participants was over time). The coefficients for the correlations between the relative standing of individuals across assessments were as follows: $r = .53$ for A1–A2, $r = .59$ for A2–A3, $r = .62$ for A3–A4, and $r = .67$ for A4–A5. Although these coefficients were large in Cohen's (1977) terms, they were all well below unity. In order to give meaning to these results, we decided to estimate the increase in the MCS using the method proposed by Bland and Altman (1986). To this end, the differences between the MCS scores obtained during the fifth and the first measurement, and the mean scores were determined. The plot of difference against mean is shown in Figure 2.

The average change was .11 points (CI.95 [.06, .16]) and the limit of agreement was [−.786, 1.006]. Only 17 observations (5% of the 329 persons who participated in both the first and fifth waves) fell outside the agreement limits (Bland & Altman, 1989). Regression of the means of both scores on the differences between them revealed a small but statistically significant effect, $_{adj}R^2 = 4.3\%$, Intercept = −.887 (SE = .259, CI.95 [−1.397, −.378]), $\beta = .23$ (SE = .06, CI.95 [.116, .350], $p < .001$, which may be interpreted as an indication that the initial level of metacognitive knowledge is a positive moderator of subsequent changes in metacognitive knowledge. However, we are aware that the small size of the effect makes the phenomenon difficult to recognise and note the need for future research to control for many variables that may affect it.

DISCUSSION

This longitudinal study examined continuity and change in the metacognitive self during emerging adulthood in a large sample of young adults followed over three years of university. The MCS was assessed five times, that is, every six months. Longitudinal analysis of growth in the MCS gave greater insight into the age-related MCS changes than could be obtained from previous cross-sectional data (Konarski & Brycz, 2017).

The ANOVA results showed that during the critical university period, students gradually became more aware of their own biases. This suggests that emerging adulthood may constitute a developmen-

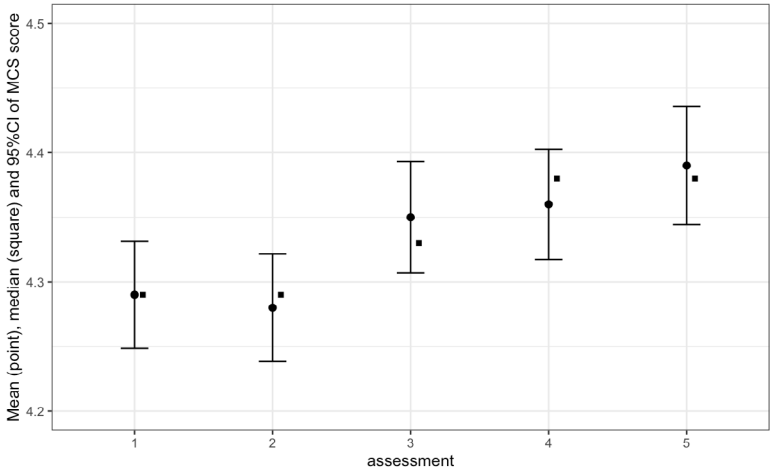

FIGURE 1.
Comparison of Metacognitive Self scores by assessments.

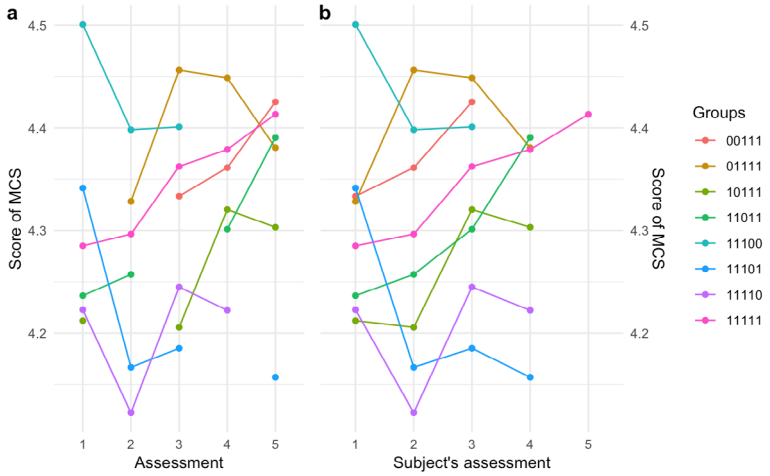

FIGURE 2.

Panel A: The growth in the MCS level over time. Panel B: the growth in the MCS level over the sequence of waves. The figure illustrates the developmental character of changes in the MCS level—chronological profiles presented on the left coincide with 4.4 (except for those who missed the 4th measurement, marked "11101"), while the same data broken down by sequence (the graph on the right) seem less orderly, which suggests that the development of the MCS depends on the time and not on the participation in the study.

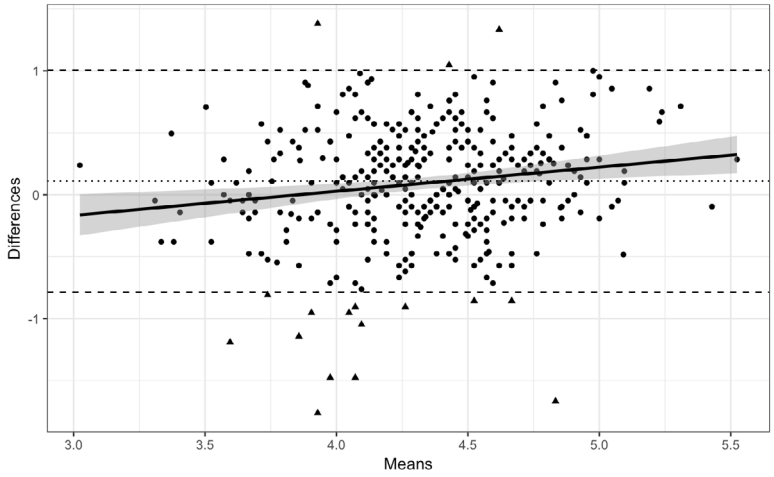

FIGURE 3.

Bland-Altman difference plot. The points are differences of the Metacognitive Self (MCS) scores between the 5th and 1st assessment (y axis) versus mean of these scores (x axis). The regression line (with SE marked in gray) shows that a greater increase in MCS score was observed in people with a higher baseline MCS level. Triangles represent persons (5% of the sample) whose change did not correspond to MCS height.

tal turning point that, in general, has a positive impact on the MCS. Our observation is in agreement with the evidence presented above, which shows that emerging adults have a greater capacity to monitor their cognitive processes (learning, memory, problem-solving, decision-making, etc.) than adolescents and children (e.g., Castel et al., 2011; Vukman, 2005). Previous findings may also help explain the observed effect. The mechanisms underlying the monitoring of one's knowledge and strategies for regulating learning and remembering have been studied in adults (Koriat et al., 2014). These studies suggest that feedback is of crucial importance to human learning and memory processes.

Metacognitive processing is thought to be intrinsically motivated (e.g., Brycz et al., 2019). Koriat et al. (2014) posited that children's metacognitive ability to make judgments of learning "develops at a much later stage than that at which children have been claimed to reach adult-like metacognitive monitoring" (p. 3). Koriat, Ackerman, Lockl, and Schneider (2009) demonstrated a developmental increase in data-driven regulation. They suggested that the feedback sensitivity of JoLs, that is, data-driven regulation of learning, matures between first grade and emerging adulthood. A sensitive learning efficiency score was also found to increase monotonically with age (Castel et al., 2011). It seems that until the age of 18 years, individuals may be unaware of their reliance on heuristics, for example, for memorising information (e.g., Koriat et al., 2009). Emerging adulthood seems to be the developmental stage in which the awareness of one's own cognitive biases increases most markedly.

The metacognitive knowledge about oneself is an essential component of one's understanding of the world and the self. Hence, the way in which such knowledge is acquired is of considerable practical and theoretical interest to learners, educators, and researchers (Holland, Holyoak, Nisbett, & Thagard, 1989). Yang, Potts, and Shanks (2017) demonstrated the existence of the so-called backward testing effect, that is, that testing of previously learned information enhances learning and retention of new information. Emerging adults' drive to acquire information about their own biases might help not only to augment their MCS, but also to enhance deeper knowledge about personal biases and heuristics. The knowledge about their own biases may allow emerging adults to decide whether to worry about biases or accept them.

The growth in awareness of one's own biases among emerging adults supports the view of emerging adulthood as a time of increased knowledge absorption. Emerging adults' processes of reasoning become more abstract and sophisticated. Their ability to adopt a healthy detachment from their own emotions, behaviour, and thinking contrasts with that of the earlier developmental phase —adolescence. It seems important to highlight the fact that emerging adulthood often involves changing environments, such as moving out of the parental home or to a new city, and these experiences might also contribute to MCS growth. As King and Kitchener (2015) pointed out, complex cognitive abilities are critical for emerging adults' ability to adjust to the demands made by the transitions to adulthood. Effective metacognition is a powerful aid in achieving better self-understanding and self-regulation. In addition, the overall increase in MCS during university years is in line with the maturity principle, according to which the levels of traits that reflect maturity and adaptability increase with age (Roberts & Wood, 2006).

In the present study, we also examined the differential stability of the MCS. Our results show that the MCS was relatively stable during the three-year observation period, although less stable than, for example, self-esteem appears to be during emerging adulthood (Chung et al., 2014). We also observed both positive and negative changes in the MCS. More specifically, students with relatively high MCS scores at the beginning of the observation period showed further increases, whereas the MCS of those with relatively low scores at the outset declined. This finding can probably be ascribed to the nature of emerging adulthood. As a time of transition, emerging adulthood is often a time of struggle, uncertainty, and anxiety (Arnett, 2000). Individuals who have sufficient metacognitive knowledge and skills at their disposal should be able to deal with the challenges they face and improve their metacognition. However, some emerging adults may be overwhelmed and confused by the complexity of their new decision-making responsibilities and fall back on a less sophisticated, less cognitively demanding way of thinking. As King and Kitchener (2015) emphasised, "reasoned thinking takes conscious effort and can be difficult, and people may rely on their functional level of reasoning in many areas as an easier option" (p. 122). Our finding is also broadly consistent with Koriat's (2016) conclusion that individuals are active participants in their own lives, with an arsenal of cognitive tools they can deploy to achieve goals, and that subjective beliefs and feelings govern their choice of goals and use of these cognitive tools. Thus, research into metacognition implies that motivation to maintain the metacognitive level of functioning is intrinsic.

Taken together, our findings contribute to the understanding of how metacognition changes throughout the lifespan by providing much-needed data on the period of emerging adulthood.

FOOTNOTES

[1] Students who agreed to participate in the study were asked to sign a written consent letter. The letter was approved by the National Classified Board. An agreement between the National Classified Board and its division, the Personal Data Protection Council, and University of Gdansk (no. 17a/13) allowed to ask students of the Departments of Humanities and Social Sciences to participate in the study. All participants provided written consent to participation in the three-year National Science Centre project.

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