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Correlation between social intelligence and motor development of children in the 4.0 era

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Abstract*:* Social intelligence and motor skills are essential for a child's development. This study in the Sleman Regency investigates the relationship between social intelligence and motor skills development in 170 primary school students. The data collection instruments included a Social Skills Rating Scale (SSRS-T), a questionnaire, and Nurhasan's motor ability test. The data used meet the normality and linearity conditions, as indicated by the coefficients of 0.721 and 0.108, each greater than 0.05, respectively. The results show that 71.17% of the sampled students have above-average social intelligence (SI). The sampled children's SI can be grouped into very good (top 10%), good (next 18.82%), average (middle 42.35%), poor (next 25.29%), and extremely poor (bottom 25.29%); the respondents' rates in each category are as mentioned. Regarding motor development, 8.24% of the students were categorised as very good, 20.59% as good, 36.47% as average, 32.35% as poor, and 2.35% as extremely poor. The study found a moderate positive correlation (r value of 0.344) between social intelligence and motor development. With the determinant R^2=0.118, given the variable indicators, high importance on communication and physical interaction explains at least 11.8% of the variation in the students' motor skills development. The researchers recommend that further studies on the habits of electronic gadget usage by the sampled children be carried out to shed light on unexploited frontiers for children with poor and extremely poor social intelligence.

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INTRODUCTION

The 4.0 era, also known as the Industrial Revolution 4.0, is a phase marked by the advancement of digital technology, particularly in widespread connectivity and automation. This era has brought about profound changes in how humans engage in production, communication, and interaction with technology. The name' era 4.0' stems from the global occurrence of the fourth industrial revolution, a significant industrial transformation. This revolution is significant due to its considerable impact on global lifestyles and ecosystems. The industrial revolution 4.0 has the potential to enhance the economy and the quality of life, characterized by replacing outdated systems with technologically advanced systems (IoT). IoT is a concept that enables the transmission of data over a network without the need for direct human-to-human or human-to-computer interaction (Savitri, 2019: 86). The advent of Era 4.0, indicated by swift progress in digital technology and widespread transformation across multiple industries, has resulted in significant alterations in human interaction with the surrounding environment. These modifications not only influence the lives of adults but also exert a substantial influence on the growth and maturation of children. Children are raised in an environment abundant with intelligent devices, digital apps, and unrestricted availability of worldwide knowledge. These advancements present novel problems and prospects in their growth, encompassing elements of social acumen and physical development.

The relationship between social intelligence and motor development can be understood as a complex interaction between a person's social interaction abilities and motor abilities (Ismail *et al.*,

2020: 2). The growth and development of children involve two primary factors: social intelligence and motor development. Social intelligence pertains to an individual's capacity to engage with others and effectively navigate and comprehend the social intricacies in their surroundings. Social intelligence encompasses various abilities, including empathy, effective verbal and nonverbal communication, and the capacity to establish positive interpersonal connections. These skills involve the aptitude to understand and interpret facial expressions, body language, and tone of voice and to discern the emotions and motivations of others. According to Gardner (2000: 39), children with high social intelligence can form favourable interactions with others. Social intelligence encompasses the capacity to comprehend group dynamics, navigate conflict, and cultivate positive interpersonal connections. Social intelligence can form healthy interpersonal relationships, improve the ability to interact well and understand other people's feelings, and help children build positive social relationships (Wijaya, *et al*., 2024: 115). During the initial phases of their lives, children acquire fundamental social intelligence by engaging in relationships with their parents, siblings, peers, and the surrounding environment.

Children's motor development includes the maturation and regulation of body motions, intricately linked to developing motor centres in the brain. Hurlock (1998) defined motor development as the progressive refinement of physical movements achieved through the synchronised functioning of nerve centres, nerves, and muscles. Motor development involves synchronising the functioning of the neurological system, muscles, brain, and spinal cord. Motor development is critical to child development (Saakslahti & Niemisto, 2021: 463). Motor development is a progressive and ongoing process corresponding with age, wherein individual movements progress from an essential, uncoordinated, and unskilled stage to the acquisition of intricate and coordinated motor abilities. Motor development plays a crucial role in the entire development of an individual. Children's motor development encompasses their ability to regulate and coordinate bodily motions. Gross motor development encompasses acquiring abilities that use major body parts, such as ambulation, sprinting, leaping, and hurling. It enables children to investigate the tangible environment surrounding them, fostering the development of coordination, balance, and endurance. Fine motor development includes using small body parts, specifically fingers, to execute precise tasks such as writing, sketching, and grasping small items. These motor skills are crucial in advancing cognitive capacities and everyday tasks that demand accuracy. Children can acquire and cultivate the necessary physical abilities for activities and sports from the early stages of their development. The initial phase of a child's development is crucial for acquiring these abilities in an enjoyable and non-competitive environment, ensuring that children engage in sports with joy and a sense of ease.

Children's motor development pertains to the child's capacity to utilise and regulate the musculature of their body. The advent of era 4.0 has ushered in substantial transformations in our lifestyle, employment, and engagement with technology. Despite the numerous technological advancements in the 4.0 era, some issues can impact the motor development of children. Various issues exist in the domain of motor development. Motor development in children can be associated with social intelligence. The absence of social connection between children and their peers and their social surroundings is a social intelligence issue requiring specific care. It is important to note that engaging with the environment can also contribute to children's motor development. Moreover, children who encounter challenges in communication may also face hindrances in developing their motor skills, as good communication plays a crucial role in coordinating bodily motions. Engaging with digital media and intelligent gadgets can mould children's communication and impact their physical development (Gao, *et al.*, 2017: 228). The prevalence of digital technology, such as video games, smartphones, and tablets, often leads to a deficiency in social connection among children in the 4.0 era. Children frequently exhibit excessive screen time and engage less in play and physical exertion. The absence of social engagement can impact a child's motor development, particularly in gross motor skills, such as walking, running, and jumping.

The preceding discussion has sparked the author's keen interest in pursuing further research in this area. Consequently, the researchers are motivated to undertake a study to investigate the correlation between social intelligence and motor development of children in the 4.0 era especially in Sleman Regency. This investigation aims to explore the intricate relationship between social intelligence and motor development among children, particularly in the context of the rapidly evolving technological landscape of the 4.0 era.

METHODS

This study used a quantitative, especially a correlational design, as the researchers investigate the relationship between their variables of interest. The research participants were elementary school students in grades 4, 5, and 6 in Sleman Regency, totalling 170 students (n=170) whose selected with stratified random sampling. The social intelligence data were gathered using the Social Skills Rating Scale for Primary School Students-Teacher Form (SSRS-T) test (Karatas, 2015). Data on other aspects of interest were collected using a questionnaire (Aithal, 2020: 237) to get facts according to the respondent's experience. The students' motor development-related data were assessed using motor ability tests developed by Nurhasan (2004). These tests consisted of (1) a 4 x 10 meters shuttle run test, (2) a ball throwing test at 1 meter against a wall, (3) a stork stand positional balance test, and (4) a 30 meters sprint test. The validity of the motor ability tests was determined to be 0.87, while its reliability was found to be 0.93. This study carried out the normality and linearity condition tests before correlation analysis to minimise the measurement error (Farber and Larson, 2002). Correlation coefficients were calculated while keeping other extraneous variables controlled or as constants using SPSS 22. The research questions guiding this study's argument patterns were: 1) which minimum condition tests are met for this correlation study? 2) is there any correlation between the sampled era 4.0 primary school students' social intelligence and motor skills development? 3) what variation in motor development does social intelligence explain in the respondents' motor development?

RESULTS AND DISCUSSION

Results

The results report starts with condition tests. The normality test in this study was employed to ascertain the normality or non-normality of a distribution. The normality test used in this study utilised the Kolmogorov-Smirnov test. The criteria for determining the data's normal distribution were based on the significance level: a p-value < 0.05 would imply a deviation from the normality condition. In contrast, a p-value > 0.05 would indicate that those data were normally distributed.

Table 1. Results of the Normality Test

Variable	Z	p	sig. at α=0.05	Notes
Social Intelligence	1.329	0.059	0.05	Normal
Motor Development	0.608	0.853	0.05	Normal

Based on the results in Table 1, it was evident that the social intelligence data p-value of 0.059 was more significant than 0.05, which indicates the normal distribution of that data set. Similarly, the motor development-related data has a p-value of 0.853>0.05, which means that the normality criterion was met, too.

The defining criteria for the linearity condition test were based on comparing the F-value to the Z score table. If the data F value was less than the standard normal distribution value, the connection between the independent and dependent variables of interest is of a linear relation. On the contrary, if the data F score exceeds that of the Z score or standard normal table, the linearity condition is violated. Table 2 displays the summary of the linearity condition test.

Table 2. Results of the Linearity Test

Correlation	df	F hit	F table	*p*	sig. at α=0.05	Notes
Social Intelligence and Motor Development Correlation	1:169	1.482	3.90	0.108	0.05	Linear

Table 2 shows the linearity condition test results for the relationship between social intelligence and motor development of the sampled students in Sleman Regency. The dataset F value (1.482) was less than the Z Score table value (3.90), with sig. 0.108> 0.05. This indicates that the relationship between social intelligence and motor development was linear.

The results of research on children's social intelligence era 4.0 in Sleman Regency, displayed in diagram form, can be seen in Figure 1.

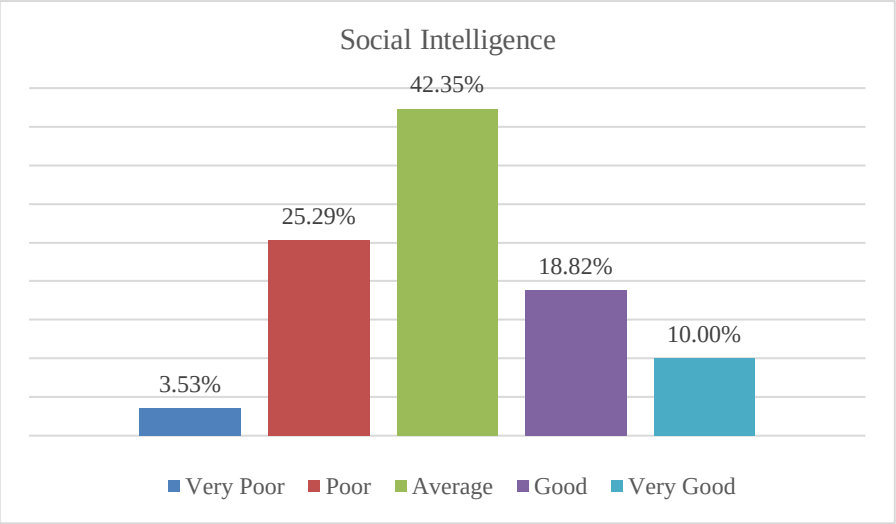

Figure 1. Social Intelligence of Children in the Era 4.0 in Sleman Regency

According to Figure 1, the social intelligence of children in the 4.0 in Sleman Regency could be categorized as follows: very good (10%), good (18.82%), average (42.35%), poor (25.29%), and vey poor with a rate of 3.53%.

The findings of a study on the motor development of children during the 4.0 era in Sleman Regency are presented in diagram format (see Figure 2). According to the Figure 2, it was evident that the motor development of children in the 4.0 period in Sleman Regency could be classified: very good (8.24%), good (20.59%), average (36.47%), poor (32.35%), and very poor (2.35%).

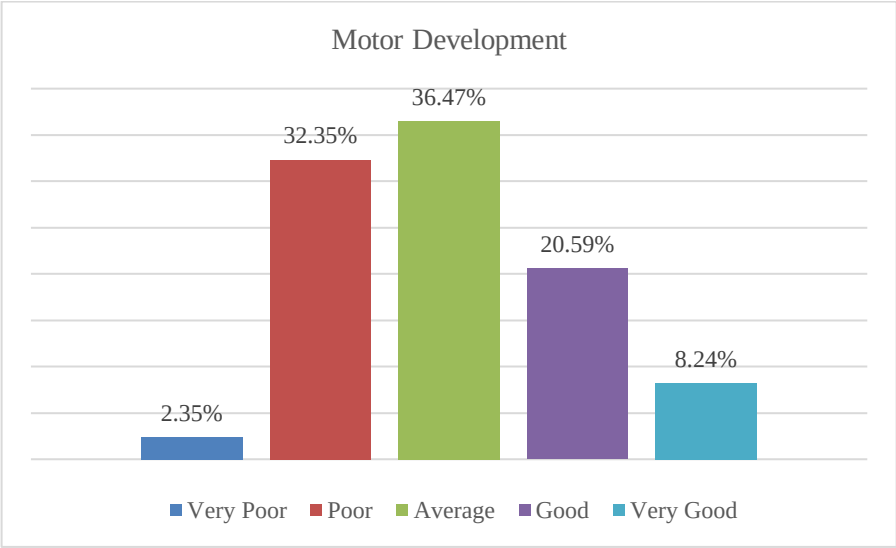

Figure 2. Motor Development of Children in the Era 4.0

Results of Hypothetical Test

Once the data criteria have been fulfilled, the subsequent phase involves testing the hypothesis put out in this research. To assess the strength of the relationship between social intelligence and motor development, the product-moment correlation test developed by Karl Pearson was employed. The findings of the correlation study can be characterised in Table 3.

Table 3. Results of the Correlation Test

Variables	N	Pearson r Table	Calculated r	Sig 5 %
Social Intelligence and Motor Development r	170	0.148	0.344	0.000

Table 3 shows the comparison of the calculated r and Pearson Correlation Table values. In this case, the alternative hypothesis (H_a) was accepted. At the same time, H_0 was rejected as the calculated r-value 0.344 was greater than the critical r-value of 0.148 at a significance level $\alpha = 0.05$ with a sample size of 170. The finding showed that there was a correlation between social intelligence and motor development in the sampled elementary school 4.0-era students in the Sleman Regency. Using the calculated correlation coefficient (r) of 0.344, the related determination coefficient (R^2) value is 0.118. The determinant coefficient value, multiplied by 100, was a metric used to quantify the proportion of contribution an independent variable has in explaining variation in the dependent variable. Therefore, the determinant $R^2=0.118$ indicates that social intelligence explains 11.8% of the motor development for children in era 4.0 in Sleman Regency. The remaining 88.2% is attributed to other factors.

Discussion

Starting this discussion with the condition tests, the conditions of normality and linearity are met in this study. The motor development variable has a p-value of 0.853>0.05, proof that the normality criterion is met. Equally, for the social intelligence-related, the p-value 0.059> 0.05 indicates the normal distribution of this sub-data set (Knief & Forstmeier, 2021), leading to measurement error-free conclusions. The linearity criterion was met: the F value (1.482) is less than the Z Score table value (3.90), with sig. 0.108> 0.05, which Li et al. (2017) support in their dataset's linearity evaluation. This answers research question No. 1: At least the normality and linearity condition tests are met, encouraging the researchers to continue testing the correction hypothesis.

The social intelligence of the sampled children can be categorised into very good, good, average, poor, and extreme categories, the rates of respondents, each being 10%, 18.82%, 42.35%, 25.29%, and 25.29%, respectively. So, 71.17% of the sampled era 4.0 students have more than average social intelligence. With this equipment, they can follow instructions related to 'dos and don'ts', which Silver et al. (2021) support: social intelligence helps kids see the impact of making a mess. This sort of social intelligence categorisation among students is also traceable in Smith's (2016) research about bullying and Kurniawan and Syukur's (2017) investigation of leadership principles. So, research question number 2 is also answered: there is a correlation between the sampled era 4.0 primary school students' social intelligence and motor skills development. Moreover, the sampled children's motor development can also be categorised as Haywood and Getchell's (2021) guide. In this study, the very good, good, average, poor, and very poor categories are occupied respectively by 8.24%, 20.59%, 36.47%, 32.35%, and 2.35% of the total sample size. This finding partially checks out in Gaul and Issartel (2016) as they investigated acceptable motor skill proficiency. Similar categorisation is found in Veldman et al. (2019), as they successfully correlated motor skills and cognitive development.

Regarding the central finding, the comparison of the calculated r and Pearson Correlation Table values indicated a correlation between social intelligence and motor development for those era 4.0 children. The calculated r-value of 0.344 > critical r-value of 0.148 at a significance level $\alpha = 0.05$ substantiates such correlation given the sample size of 170. This finding is like other researchers, both among adult students (Geofroy & Evans, 2017; Melnychuk et al., 2020; Avlaev & Abdullaeva, 2023) and children (Kenny et al., 2016; Osiurak et al., 2016); many research results appearing in Van der Linden et al. (2017) as they demonstrated in their meta-analysis study.

In the same perspective, research question No. 3, about the variation in motor development each sampled child's social intelligence might explain, is answered by considering the de determinant R2=0.118, which indicates that Social Intelligence explains 11.8% of the Motor Development for the sampled era 4.0, children in Sleman Regency. The remaining 88.2% is attributed to other factors (Kim et al., 2016; Street et al., 2017). The main finding also emphasises that social intelligence is among the multiple aspects that influence children's motor development. There is thus an indication that the sampled children can adjust to evolving circumstances around them effectively, which Rohmansyah et al. (2022): 71.17% of the era 4.0 children in Sleman Regency are socially intelligent. To their level, they can anticipate, believe, react and behave well in most achievement environments.

CONCLUSION

This correlational research substantiated the correlation between the era 4.0 sampled primary school students' social intelligence and motor development. The finding proves that the sampled children can effectively adjust to evolving circumstances. To their level, they can anticipate, believe, react, and behave well in most achievement environments. Given the indicators of the two variables, the evidence of correlation between the students' social intelligence and their motor skills development indicates that the kids engage in social engagement. This leads them to improved motor skills. This brings hope that the vailing trend of children using cell phones when congregating is not generalised in the Sleman Regency. The sampled children's social contact and physical activity correlated. Possession of social intelligence implies placing a high importance on communication and physical interaction, which will consequently influence their motor development. Further research would investigate other factors explaining the variation in motor skills development since social intelligence explains only a tiny portion of the problem. The habits of electronic gadgets used by the sampled children would also highlight unexploited frontiers for children with poor social intelligence.

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