JPII 15 (1) (2026) 112-124

Jurnal Pendidikan IPA Indonesia

https://journal.unnes.ac.id/journals/jpii

ANALYSIS OF HUMAN ORIGINS AND DEVELOPMENT IN MODERN SCIENCE AS A SCIENTIFIC EXPLANATION FOR STRENGTHENING AL-QUR'AN SCIENTIFIC LITERACY

S. Haryanto[1], S. Jumini*[2], N. F. A. Rahman[3], I. Purnamasari[4], M. A. M. Kamal[5]

[1]Islamic Early Childhood Education, Faculty of Tarbiyah and Teacher Training, Universitas Sains Al-Qur'an, Indonesia
[2]Physics Education, Faculty of Tarbiyah and Teacher Training, Universitas Sains Al-Qur'an, Indonesia
[3]Family Medicine and Medical Education, Universitas Islam Malaysia, Malaysia
[4]Nursing Science, Faculty of Health Science, Universitas Sains Al-Qur'an, Indonesia
[5]Science of the Qur'an and Interpretation, Faculty of Sharia and Law, Universitas Sains Al-Qur'an, Indonesia

DOI: 10.15294/jpii.v15i1.30038

Accepted: July 10th, 2025. Approved: March 24th, 2026. Published: March 24th, 2026

ABSTRACT

This study explores the complex relationship between the Islamic perspective on human creation, as detailed in the Quran, and modern scientific understanding, particularly in embryology, genetics, and developmental biology. This research used a hermeneutic-phenomenological method, which juxtaposes the Quranic narrative of human creation, including the creation of Adam from clay and the subsequent development of humans from "nutfah" (sperm drops) through various embryonic stages, with contemporary scientific discoveries. Data analysis was carried out using QDA Miner software. The results of this research provide a comprehensive understanding and view of human creation while validating the contribution of modern science to understanding human origins and development. These findings show remarkable symmetry between the Quranic descriptions and modern scientific knowledge, highlighting stages such as "nutfah," "alaqah" (blood clots), "mudghah" (chewed substance), bone development, and the covering of bones with flesh. This study not only underlines the suitability of religious narratives with scientific insights but also enriches the dialogue between science and religion to increase the scientific literacy of the Quran, and the values of science education, such as integrative, critical, empirical, spiritual, ethical, and interdisciplinary, and has a major impact on the development of science.

Keywords: human creation; Quran; Science

INTRODUCTION

The process of human creation has been the focus of attention in various religious traditions and scientific research. The Quran, as the primary source of Islamic teachings, provides an in-depth view of human creation. Moreover, modern science has also carefully investigated this process (Huang, 2021). In this study, the process of human creation is examined from the perspectives of the Quran and modern science to comprehensively expand understanding of it (Sururi et al., 2020). The theory of evolution put forward by Charles Darwin, that human ancestors were a type of ape who gradually underwent physical changes until they became like humans today, is very different from what is explained in the Quran regarding the creation of humans (Pakravan & Motaharipour, 2019; Muhamad et al., 2020).

Darwin's theory of evolution faced a crisis and doubt at the end of the 20th century, as genetics developed and the structure of the DNA

***Correspondence Address**
E-mail: srijumini@unsiq.ac.id

molecule was discovered by the Austrian botanist Gregor Mendelan in 1865. In 1950, after the discovery of the structure of genes and chromosomes, which strengthened the discovery of the structure of the DNA molecule (Deoxyribonucleic Acid), which contains genetic information, challenged Charles Darwin's theory of natural selection and evolution (Awaluddin et al., 2023). Darwin's theory cannot explain universal evolution. With the development of technology and genetic science, through more sophisticated microscopes, early organisms with their chromosomes have been discovered. In these chromosomes, genes can be found that are the successors of the characteristics passed down from parents to children. Since human cells have 46 chromosomes, they come from 23 fathers and 23 mothers. From these results, it can be concluded that wheat seeds are still produced from wheat seeds, and that humans are still born (Snijders, 2014).

Many scientific discoveries and theories have emerged in the modern era, including theories of human origins. Some scientists support the theory of evolution, which holds that humans evolved from earlier creatures. On the other hand, many religious experts oppose the process of human evolution and refer to the holy book (Quran), calling Adam the first human created from the earth with various terms such as "Turab," "Thien," "Shal-shal," and "Sualalah" (Nariman et al., 2020). Even though humans are made of natural matter, their existence differs from that of other creatures because Allah gave them intelligence and understanding. Humans are caliphs on earth, and the Quran confirms that everything in nature has been subordinated to humans. This article highlights contextual issues between the Quran and scientific knowledge. In exploring human origins, we need to combine scientific and spiritual understanding. This article contributes to strengthening scientific literacy based on the perspective of the Quran.

The urgency of this research varies depending on several factors, including social, cultural, and intellectual contexts. Therefore, this research is urgently needed to support dialogue between science and religion, improve scientific literacy in religious contexts, and deepen understanding of complex contemporary challenges. This research also enriches understanding of human origins, strengthens scientific literacy, and facilitates dialogue across disciplines. Quranic science literacy will make it easier for teachers to deliver classroom instruction on human creation.

By combining the perspective of the Quran with modern science, a richer understanding of human creation can be obtained. It also confirms that religion and science do not conflict but complement each other in the search for truth. Thus, a holistic understanding of human creation will bring significant benefits to the development of science and to being grateful for the greatness of Allah SWT's creation (Parwanto & Riyani, 2023). In conclusion, human creation is a deep and complex topic that has been revealed in the Quran and through scientific research (Wahid et al., 2026). Through ongoing research, we can deepen our understanding of the origins and nature of humanity and expand our knowledge and wisdom as creatures created by Allah SWT (Badriyah & Miski, 2025).

Research and studies on the origins and development of humans from the perspective of modern science and the Quran have been widely studied in various journals. Sulaiman et al. (2021) analyze the Quranic text and its various interpretations of human origins. Furthermore, Fauzan et al. (2022) examine human creation from the perspective of the Quran and modern science, exploring the process of creation and its relevance to scientific knowledge. The Quran states that humans came from dry clay, which was given shape, while modern science discusses the process of human reproduction (Muhamad et al., 2020; Fauzan et al., 2022). The monumental book "Asal-usul Manusia: Menurut Bible, Al-Qur'an, dan Sains" by Maurice Bucaille et al. discusses the origins of humans based on the Quran and modern science (Reynolds, 2020; Arib et al., 2022).

This research helps bridge the gap between modern science and the Quranic text on human origins and development. The goal is to provide scientific explanations of concepts contained in the Quran and to strengthen scientific literacy in Muslim societies. Scientific literacy on human origins, based on a study of modern scientific literature and reinforced by divine verses, will provide a solid foundation for the younger generation's unwavering understanding of how to prepare themselves as individuals who reproduce and produce offspring. The novelty of this article lies in its analytical approach. This article integrates modern scientific findings on human origins and development with relevant interpretations of the Quranic text.

Furthermore, this study also presents new findings or perspectives on how modern scientific understanding can enrich the interpretation of scientific literacy in the Quran. Thus, the existence of science is very useful for explaining Quranic verses. The Quranic verses become a stimulus for the development of science through scientific research.

METHODS

This research adopted a hermeneutic-phenomenological methodology approach (Rame, 2014; Creswell & Poth, 2016) to interpret the narrative of human creation in the Quran and compare it with the explanations provided by modern science (Schäfer, 1998). This framework, drawing on the work of Paul Ricoeur (Davis, 1971), enables an in-depth analysis of the interaction between the spiritual and empirical dimensions in understanding the origins and essence of human existence. Integrating hermeneutics for interpreting texts and phenomenology to understand the nature of human experience (Vitiello, 1997) facilitates a more holistic understanding of human existence. From the internal perspective of the experiencing subject, this approach explores the deeper meaning of the creation narrative while enriching understanding of the phenomenon (Dagotto, 2001).

The data sources used in this research were divided into primary and secondary data sources. The primary data source was the Quranic verses that discuss the process of human creation and its interpretations. Quran verses related to the process of human creation include QS al-Imran: 59; QS al-Kahf: 37; QS al-Hajj: 5, QS ar-Rum: 20; QS Fatir: 11, QS Gafir: 67, QS al-Maidah: 110; QS al-An'am:2; QS al-A'raf: 12,17,61; QS al-Mu'minun:12; QS Shad: 71.76; QS as-Sajadah:7; QS al-Hijr: 26, 28, 33; QS Ar-Rahman: 14, and QS al-Hijr: 28-29. The interpretation of the Quran used Al-Mishbah by M. Quraisy Syihab and Ibn Katsir. Secondary data sources used several other written works relevant to the studied topic, including scientific publications in books, articles, and research results on human creation (Creswell & Poth, 2016). It was not obtained from direct experiments, but the results of experiments have been published in national and international journals. Secondary data sources supported and complemented the primary data found, expanded the study, and deepened the discussion.

The research was conducted by reviewing scientific literature on human creation and by studying the Quranic verses and their interpretations to understand the scientific meaning of human creation. Researchers as instruments in this research (Bungin, 2022) were supported by diverse knowledge to review aspects of educational psychology, natural science education, physics, biology, chemistry, and health. QDA Miner is vital in qualitative data analysis to minimize researcher subjectivity (De Moraes, 2020; Vaismoradi, 2013). This software allows researchers to organize, analyze, and discover patterns in interview data, documents, and field notes.

The analysis technique used in this research was manual, with QDA Miner software. The manual technique used inductive thinking, and the Quran interpretation used the tahlili interpretation method. Inductive thinking departs from a logical process of using empirical data through observation to develop a theory; organizing separate facts or observations results in a series of relationships or a generalization (Bungin, 2022). The tahlili method was used to interpret the verses of the Quran, explaining all aspects of their content and the meanings contained therein through the interpreter's expertise and tendencies. The tahlili method enabled the thorough understanding of verses and letters in the Quran. QDA Miner helped the researchers understand the complexity and nuances of data (Turrentine, 2019) related to human creation in the Quran and modern scientific perspectives (Braun, 2006) through features such as coding, text search, frequency analysis, and data visualization. QDA Miner is a qualitative data analysis software developed by Provalis Research to help researchers systematically process text and visual data. In qualitative research, QDA Miner is used for coding, categorization, pattern analysis, data visualization, and the interpretation of results in a more structured, measurable manner. This research contributes to the dialogue between religion and science and offers a broader perspective on human creation that reflects both spiritual richness and scientific discovery.

RESULTS AND DISCUSSION

The Quran presents various verses that describe the process of human creation, from the creation of Adam as the first human to the process in general. The Quran also explains how humans were created from the earth, had their souls breathed into them, and were endowed with various privileges and potentials (Rebitzer et al., 2004). In the Quran, Allah SWT has outlined the phases of human creation in several places. Somewhere, Allah SWT stated that He created Adam from clay. Regarding the creation of Adam's descendants, it is explained that they were created from the essence (extract) of soil contained in spermatozoa and ovum (Kloxin, 2009).

In this phase of human creation, several terms are used in the Quran: "Alami," "Timah," "amain," "Masnun," and "Salsa." These terms in Arabic have different meanings, so it can be said that these elements undergo a creative process until they become a form that is entirely different from the initial elements (Kahn, 2002).

Table 1. The Terms of Elements of Human Creation in the Quran

No.	Term	Description	Quran
1	Turab	"Turab" is defined as soil particles or ground dust. In the Quran, Allah states that He created humans from soil (turab) and then made their offspring from semen. Allah SWT also mentioned that humans become alive after the "Ruh" is breathed into them, and then they are given hearing, sight, and a heart. Even so, only a few people are grateful for the perfection of this gift from Allah. Humans, with their origins turned around, and their "Ruh" developed into physically perfect beings. Even Allah SWT stated that human creation was in the best condition (QS. At-Tiin /95:4).	QS al-Imran:59; QS al- Kahfi : 37; QS al-Hajj : 5 QS ar -Rum: 20; QS Fatir :11 QS Gafir : 67.
2	Timah	"Timah" is an Arabic word for clay or clay extract. Clay is considered the primary material used to make the first humans emerge (Adam AS). From the perspective of the Quran, the creation of humans from clay demonstrates the miracles and wisdom of Allah in creating creatures. Clay, as the essential element, symbolizes human fragility and dependence on the Creator.	QS al-Maidah:110; QS al-An'am:2; QS al- A'raf : 12,17,61; QS al-Mu'minun:12; QS Shad : 71,76; QS as-Sajadah:7.
3	H a m a ' i n masnun	Hama'un masnûn is another word that refers to the type of land that humans come from. The phrase "hama'un" basically means "black soil that smells bad." This is not much different from the meaning put forward by ath-Thabary, as soil changes color to black (dark black mud) (Ṭabarī, 1954) in the process at Hama'in. The masnun stage is a transitional process between tin and salsal.	QS al- Hijr : 26, 28, 33
4	Salsal	"Salsal" means pottery that is dried before the firing process. When the initial process of physical human creation reached the *stage of salsal*, Allah breathed the "Ruh" into him to create a complete human being (Hanafi, 2017).	QS Ar-Rahman: 14 QS al-Hijr: 28-29

The creation of humans is a fundamental aspect of understanding religion and science. As the primary source of Islamic teachings, the Quran provides an in-depth view of the origins and process of human creation. On the other hand, modern science, especially biology and anthropology, offers explanations based on scientific discoveries and research about human evolution, reproductive processes, genetic structure, and human embryo development (Kloxin, 2009).

In the Quran, the creation of humans is considered a divine act full of majesty. Allah SWT created humans from earth, especially clay, and exhaled the "Ruh" from Him. Human descendants of Adam (Hurriyat Adam) regenerate through the union of sperm and egg cells. After fertilization occurs, the process of developing into a fetus begins. The Quran chronologically explains the stages of embryo development in the womb, as expressed in QS Al-Mu'minūn (23:14) (Deuraseh & Yaakub, 2010). This verse explains that an embryo begins as a clot of blood, then develops into a lump of flesh, and finally into a bone. These bones are then coated with a layer of flesh and finally take the shape of a creature (Peng, 2012).

Figure 1. The Stages of Human Creation

Nuftah

Nuṭfah is an Arabic term in the Quran that describes the initial process of human formation. Nuṭfah means "a little or a drop of water." In a scientific context, "nutfah" refers to the concentration of fluid containing sperm. The sperm or spermatozoa in this fluid are shaped like a fish with a tail, which in Arabic is called "sulalah" (Bollacker, 2008).

This explanation links Quranic terms to the modern scientific concept of human formation from sperm. Thus, the Quran describes, by scientific means, the initial process of human formation (Letunic, 2016).

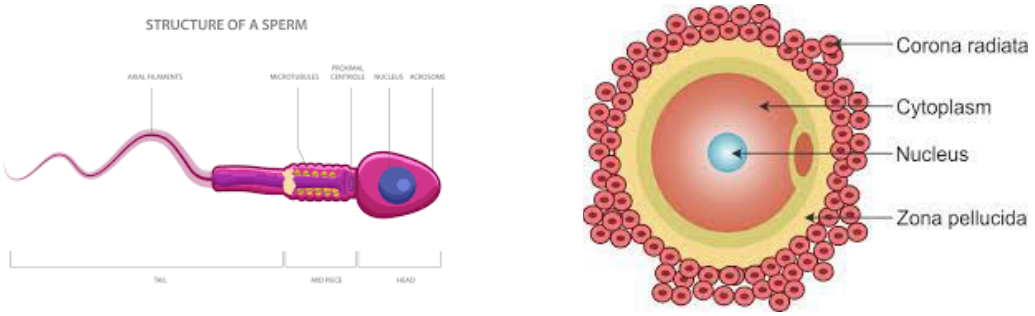

Figure 2. Spermatozoa and Ovum (Islam, 2003)

In a scientific context, "nuṭfah" refers to a concept found in medicine and embryology. Scholars such as Ibn Sina (Avicenna) and Ibn Qayyim al-Jawziyya have introduced the concept of the nuṭfah as the initial stage of human embryonic development. They describe nuṭfah as the result of the union between sperm (mani) and egg cells (al-ma'al-mudhaf) (Noyori, 2002). This concept later develops into a theory about the stages of embryonic development.

The Quran uses its language to refer to the meeting of male sperm and female ovum: nuṭfah or, in medical language, called a zygote. This term is the first accurate scientific term for the process of fetal formation, referring to the union of a man's (spermatozoa) and a woman's (ovum) sperm (Peirce, 2019). When the zygote travels through the fallopian tubes to the uterus, it undergoes the process of meiosis to become several small cells, then divides again into smaller cells to form a ball called a "morula." The morula then concaves into a "blastula," which is embedded in the inner layer of the uterine wall, forming a phase called the "gradual" phase or, in the language of the Quran, called "the 'alaqah phase."

'Alaqah

'Alaqah is a single cell called a zygote in biological terms. Quraish Shihab explains that the word 'alaqah derives from 'alaq, which is interpreted as a clot of frozen blood. In a scientific context, 'alaqah is known as a gastrula. The Quran mentions the word 'alaqah and its variations seven times (Husairi, 2019).

This explanation connects Quranic terms with modern scientific terminology, demonstrating the correspondence between Quranic descriptions and the scientific understanding of the early stages of human development (Anggara et al., 2023). Thus, the Quran describes the formation of the embryo based on biological knowledge.

Table 2. The Stages of Embryo Formation

Divirasi Alaqah	Recitation of the Quran
Al – 'Alaqah	mentioned once in the QS (Al-Mu'minūn: 14)
'alaq	mentioned once in the QS al-Alaq: 2
'alaqatan	mentioned twice in the QS Al- Mu'minūn: 14, Al- Qiyamah: 38
'alaqatin	mentioned twice in the QS Al-Hajj: 5, Al-Mu'min: 67
Al – Mu'allaqah	mentioned once in the QS An- Nisā': 129

'Alaqah is a single cell called a zygote in biological terms. Quraish Shihab explains that the word 'alaqah derives from 'alaq, which is interpreted as a clot of frozen blood. In a scientific context, 'alaqah is known as a gastrula. The Quran mentions the word 'alaqah and its variations seven times (Ayu & Ardi, 2021). This explanation links Quranic terms to modern scientific terminology, demonstrating the correspondence between Quranic descriptions and the scientific

understanding of the early stages of human development. Thus, the Quran describes the following biological knowledge regarding embryo formation (Nurbayan, 2019).

In modern embryology, "Alaqah" refers to the early stage of human embryonic development, approximately between the 7th and 24th days after fertilization, during which the embryo is shaped like a blood clot and attaches to the uterine wall. The characteristics of this stage include implantation of the blastocyst into the endometrial wall, gastrulation, which forms three necessary embryonic layers (ectoderm, mesoderm, and endoderm) for the development of various organs and body structures, neurulation for the formation of the central nervous system, and the formation of the heart and circulatory system (Chaabani, 2020). The intensive cell differentiation process in this period marks the start of the formation of the body's vital structures, making 'Alaqah a critical phase in embryology that determines the path of further development and represents a biological miracle in the formation of human life (Qibty & Hamidi, 2022).

Figure 3. '*Alaqah* (blood clot) (Islam, 2003)

Keith L. Moore, a professor emeritus of anatomy and embryology at the University of Toronto, Canada, has significantly contributed to understanding the early stages of human embryonic development. In his work in 1986, Moore identified and described the 'alaqah stage as a crucial period in embryology (Hussain, 1980), during which the human embryo, between 1 and 24 days old, attaches to the wall of the mother's uterus (Suri & Tanjung, 2025). According to Moore, at this stage the embryo shows a striking similarity to a leech, both in its attachment to the uterine wall and in its appearance. Moore describes 'alaqah as a pear-shaped embryonic stage, where the cardiovascular system begins to form and becomes visible, indicating that the life of the embryo at this stage is highly dependent on the blood of the mother, similar to how leeches depend on mother's blood, the blood of their host. Around days 24-25 after fertilization, these structures have developed significantly. Moore also emphasizes that if this pre-embryo tissue is removed or aborted, it will appear similar to a blood clot, underscoring the analogy of its physical similarity to a leech (Agustina & Huda, 2020). Moore's research and conclusions have helped bridge the understanding between classical terminology and modern embryological discoveries, providing deeper insight into the complexity and wonder of the early stages of human life (Friday, 2008).

Mudghah

After the nuhtfah and 'alaqah periods, the embryo enters the mudhghah phase. In terms of language, mudhghah is material chewed by the teeth. It looks like chewed material whose shape continues to change and resembles split somites in the fetus. In this phase, the fetus looks like teeth marks on the food it eats. The fetus also rotates and experiences changes in the womb (Talebe et al., 2020).

In the Quran, the mudhghah stage is the third stage of fetal development in human creation. According to the Arabic dictionary, the word mudhghah has several meanings. The first meaning is "something that has been chewed with the teeth" (Ayu & Ardi, 2021); The second meaning is mudagh al-umur, which means "small substance" (Chaabani, 2020); The third meaning of mudhghah, mentioned by several commentators, is "a piece of meat the size of which can be chewed" (Ar -Razi, 1981; Ehwanudin et al., 2021; Faradilla, 2019). This meaning follows Allah's word in QS al-Mukminun (23): 14 (Johns, 2016).

Then, We made the sperm-drop into a clinging clot, and We made the clot into a lump [of flesh], and We made [from] the lump, bones, and We covered the bones with flesh; then We developed him into another creation. So blessed is Allah, the best of creators.

Mudhghah begins with the appearance of somites (resembling biting teeth) on day 24 or 25 in the top layer of the embryo. On day 28, several protrusions with indentations grow on the back of the embryo. The mudhghah stage is marked by extraordinary cell growth and multiplication. Several organs begin forming in this stage, such as the eyes, tongue, and lips. In the fifth week, the heart begins to beat. The embryo has also developed a placenta (Elahian et al., 2014).

Figure 4. *Mudhghah* (a lump of flesh) (Islam, 2003)

Mudhghah (blood clot) is the phase where the flesh warps, with the appearance of bubbles and grooves. Then it grows until it is 40-42 days old, and it develops hearing, sight, skin, muscles, and bones. At this stage, the brain, spinal cord, ears, and other parts have also been formed, and the baby's respiratory system has also developed. The baby's heart begins to beat; the blood flows with oxygen and food. At seven weeks of age, the baby's respiratory system begins to function, and life during the nuthfah, 'alaq, and mudhghah periods is forty days or three months, respectively (Mashkoori et al., 2016). After four months and ten days, Allah equipped it with hearing, sight, and simple movements (Yahya, 2003).

"Izam" and "Lahm"

In the development of the human embryo, according to current science, bone formation occurs before muscle tissue (Sarikhani et al., 2020). Once the bony framework is formed, muscle tissue surrounds and supports the structure. In modern scientific terminology, "Izam" (bone) and "Lahm" (flesh) refer to the essential components of the body structure. This concept is similar to that explained in traditional Islamic embryology, especially in QS al-Mukminun 14, which states that the sperm becomes a clot of blood. From a clot of blood, it becomes a clot of flesh, followed by the formation of a bone structure, which is then covered with flesh. Ultimately, this process produces creatures with different forms, confirming the greatness of Allah as a creator. This description outlines the sequence of embryo development from conception to the formation of the main body structures, reflecting a deep understanding of embryology.

In modern science, the stages called "Izam" and "Lahm" are defined as stages of tissue and organ development in the human body. The "Izam" (bone) stage can be associated with the development of the human skeletal system. At this stage, bones form from cartilage and undergo a process of hardening. This process forms the framework that will become the foundation of the human body.

Figure 5. *Izam* (bones or skeleton) (Islam, 2003)

On the other hand, the level of "Lahm" (flesh) measures the growth of soft tissue, including muscle, skin, and other nerve tissue. Some types of tissue begin to bend and flex at this point, forming a more complex human skeleton. From a contemporary perspective, the stages of "Izam" and "Lahm" are considered the evolution of the human skeleton and nervous system.

Figure 6. *Lahm* (flesh) (Islam, 2003)

"Nafkhur - Ruh"

The "Ruh" is the mover and sign of a humble person's life; without the "Ruh," the twisted body will not be pure. Another thing mentioned in the Quran is that the embryo is dissolved with three "dzulumatin shalat" QS Az Zumar: 6. Embryologists emphasize that the three main components of this process are (1) the inner wall of the mother's stomach, (2) the uterine wall, and (3) the amniotic membrane.

Figure 7. *Nafkhur* (blowing "Ruh") (Islam, 2003)

Blowing the "Ruh" by the angel into the fetus is accompanied by determining fortune, death, deeds, and fate (misfortune or happiness). The process of implanting the "Ruh" into the embryo when it is 120 days old is mentioned in the hadith of Abi Abdirrahman Abdillah bin Mas'ud RA (Hermanto & Masfufah, 2023).

From Abu Abdirrahman Abdullah bin Mas'ud RA - he said: Rasulullah Sallallahu 'alaihi wasallam told us that he is an honest person and should be trusted: Verily (the phase) of your creation is gathered in the womb of his mother for 40 days (in the form) "nuthfah" (sperm), then during that time (40 days) becomes a clot of blood, then during that time (40 days) becomes a clot of flesh, then an Angel is sent, the "Ruh" is breathed out and four things are recorded: his sustenance, his death, his deeds, whether he is lucky or misfortune (Fitriani, 2020). "By Allah who has no real God but Him, there is indeed among you who do righteous deeds with the deeds of the inhabitants of Jannah (heaven) until there is a cubit between him and Jannah, then he is preceded with a note ("taqdir") so that he does good deeds with those who practice "anNaar" (hell) until they enter it ("anNaar")" (Rahman, 2023). Indeed, there are among humans who do righteous deeds with the deeds of the people of "anNaar" until there is a distance of one cubit between him and the "an-Naar" and then it begins with a note ("taqdir") until he does good deeds with the deeds of the people of "Jannah" and enters it ("Jannah") (HR al-Bukhari and Muslim).

The main stages of QDA Miner include data preparation, import, coding, analysis, visualization, interpretation, and reporting. It starts with data preparation, which involves collecting and coding, then importing the data into the software and coding it to highlight relevant parts. Data analysis is then done using various methods and visualization to understand patterns. Interpreting the results and creating a report is the final step, often followed by iterations to refine or complete the analysis based on new findings.

At the coding stage of the "Quran Perception" and "Science Perception" research using QDA Miner, the first step is to import data related to these two domains into the software. Next, the data are coded by assigning each concept to relevant categories, such as Quranic or scientific concepts, and to specific subcategories, such as "Hama'in," "masnun," or "embryo." Once coding is complete, data analysis is performed to explore patterns and relationships between the coded concepts, using various analysis and visualization tools provided by QDA Miner. This process allows the researchers to understand better the differences and similarities between perceptions in the Quran and in science.

Table 3. Coding Frequency

Category	Code	Amount	Code (%)	Case (%)
Perception of the Quran	Turab	30	14.40	100.00
Perception of the Quran	Timah	37	17.70	100.00
Perception of the Quran	Hama'in masnun	14	6.70	100.00
Perception of the Quran	Salsal	17	8.10	100.00
Perception of the Quran	Nuthfah	18	8.60	100.00
Perception of the Quran	Alaqah	17	8.10	100,00
Perception of the Quran	Mudghah	17	8.10	100.00
Perception of the Quran	Izam and Lahm	18	8.60	100.00
Perception of the Quran	Nafkhur	17	8.10	100.00
Perception of Science	Embrio	4	1.90	100.00
Perception of Science	Semen	4	1.90	100.00
Perception of Science	A blood clot	4	1.90	100.00
Perception of Science	a lump of flesh	4	1.90	100.00
Perception of Science	bones	4	1.90	100.00
Perception of Science	layer of flesh	4	1.90	100.00

Table 3 shows two main categories that explain the stages of human embryo development: "Perception of the Quran" and "Perception of Science." Under the category "Perception of the Quran," there are various subcategories that include understanding the Quran from those

perspectives at those stages. The most frequently found subcategory is "Timah," with 37 cases, followed by "Turab," with 30 cases. The highest code percentage is owned by "Timah" at 17.70% and "Turab" at 14.40%. Other subcategories, such as "Izam and Lahm," "Nuthfah," and "Salsal," also have a significant number of cases. The "Perception of Science" category includes understanding embryo development from a scientific perspective. Although the number of cases in each subcategory is the same (4), this still contributes to understanding the early stages of the human embryo. These subcategories, such as "embryo, "semen," "blood clot," "flesh," "bone," and "layer of flesh," represent the scientific understanding of human embryonic development. The entire data shows a comparison and a varied understanding of the stages of human embryo development from the Quranic and scientific perspectives.

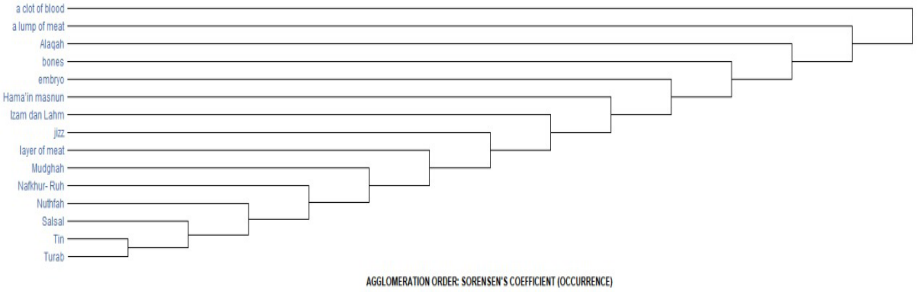

Figure 8. The Dendrogram of Co-Occurrence

This dendrogram shows that some terms are closely related, such as "Nuthfah" and "Salsal," connected in the early stages of agglomeration, indicating high similarity or repeatability that often appear together in the analyzed data. On the other hand, terms such as "Alaqah" and "Turab" are linked at a later stage of agglomeration, indicating that they do not occur together often or are less similar to other pairs in the data. In the context of embryo development, "Nuthfah" refers to the sperm or ovum, "Alaqah" to the attachment stage, such as the formation of the embryo on the uterine wall, and "Mudghah" to the flesh lump stage, all of which are sequential stages in embryology.

Table 4. Coding Sequence

Code A	Code B	Freq A	Freq B	Freq (B | A)	% of A	Freq (A | B)	% of B	% Events	z	Prob.	Expected
Embrio (embryo)	*semen*	4	4	3	7500.0	3	750.0	830.0	2.77	0.033	0.7
Embrio (embryo)	Alaqah	4	17	2	5000.0	2	118.0	560.0	-0.60	0.417	3.0
Embrio (embryo)	Hama'in masnun	4	14	2	5000.0	2	143.0	560.0	-0.30	0.550	2.5
Embrio (embryo)	Izam and Lahm	4	18	2	5000.0	3	167.0	830.0	-0.09	0.610	3.2
Embrio (embryo)	layer of flesh	4	4	3	7500.0	3	7500.0	830.0	2.77	0.033	0.7
Embrio (embryo)	Mudghah	4	17	2	5000.0	2	1180.0	560.0	-0.60	0.417	3.0
Embrio (embryo)	Nafkhur	4	17	2	5000.0	2	1180.0	560.0	-0.60	0.417	3.0
Embrio (embryo)	Nuthfah	4	18	2	5000.0	2	1110.0	560.0	-0.68	0.377	3.2
Embrio (embryo)	Salsal	4	17	2	5000.0	2	1180.0	560.0	-0.60	0.417	3.0
Embrio (embryo)	a lump of flesh	4	4	3	7500.0	3	7500.0	830.0	2.77	0.033	0.7

Embrio (embryo)	a blood clot)	4	4	3	7500.0	3	7500.0	830.0	2.77	0.033	0.7
Embrio (embryo)	Timah	4	37	2	5000.0	3	810.0	830,0	-1.52	0.089	6.5
Embrio (embryo)	bones	4	4	3	7500.0	3	7500.0	830.0	2.77	0.033	0.7
Embrio (embryo)	Turab	4	30	2	5000.0	3	1000.0	830.0	-1.07	0.207	5.3

Analysis of the correlation data between "embryo" and related terms reveals interesting patterns. First, there is a group of terms that have a very high conditional frequency of occurrence with "embryo": "semen," "layer of flesh," "lump of flesh," "blood clot," and "bone." The conditional frequency of 7500% for this group indicates that, almost every time "embryo" is mentioned in the data set, these terms also appear, suggesting a very close relationship between the two in the analyzed context. However, it is essential to note that although these associations are strong, the probability of their co-occurrence (as indicated in the "Prob." column) is low, illustrating that the association does not occur frequently in the overall data set. A positive Z value for this relationship indicates that the occurrence of these terms with "embryo" is statistically significant and exceeds the expected number under a random distribution.

In contrast, terms such as "Alaqah," "Mudghah," "Nafkhur-Ruh," "Nuthfah," "Salsal', "Timah," and "Turab" show negative Z values, indicating that they co-occur with "embryo." Less frequently than would be expected if the distribution were random. This may reflect that these terms are less closely related to "embryo" or operate in different contexts in the data set. Finally, the "Expected" values in the table highlight the differences between expected and actual events, with some terms having much lower values than actual events, confirming the strong association with "embryo." For example, "semen" has an expected value of only 0.7 but appears more frequently with "embryo," indicating a significant association.

From these data, it can be concluded that there is a strong, significant relationship between "embryo" and several specific terms. In contrast, associations with other terms were weaker or occurred less frequently. However, this interpretation must be contextualized within a broader research framework, considering that the frequency relationship does not necessarily reflect a direct cause-and-effect relationship.

Figure 9. Word Cloud

Words such as "Quran," "Manusia" (human), "Adam," "Ilmu Pengetahuan" (Science), "Modern," "Penciptaan" (Creation), and "Embrio" (Embryo) stand out, indicating that there may be a focus on a scientific or modern understanding of these concepts found in religious books, especially the Quran. Other words, such as "Tahapan" (Stages), "Darah" (Blood), "Sperma" (Sperm), and "Sel" (Cells), indicate discussions of life processes, such as embryology, in scientific and religious contexts. There are also several references to research concepts and methods, such as "Fenomenologi" (Phenomenology), "Hermeneutika" (Hermeneutics), and "Pendekatan" (Approach). Words such as "Alaqah" (which can be translated as "blood clot" and is a term used in the Quran to describe one of the stages of fetal development), "Nutfah" (meaning "droplet," often interpreted as sperm or ovum), and "Mudhghah" (meaning "lump of flesh," also used to describe

the stages of embryonic development) indicate a study of verses related to embryology. The word "Moore" refers to Keith L. Moore, an embryologist whose work is often cited in discussions of the correspondence between modern embryological discoveries and descriptions of embryology in the Quran. Words like "Pendekatan" (Approach), "Proses" (Process), and "Pemahaman" (Understanding) indicate a systematic and reflective analysis of the text.

An exploration of human creation from the perspectives of the Quran and modern science reveals the complex and diverse nature of human life's origins. It highlights the potential for dialogue and integration between religious beliefs and scientific knowledge, encouraging a holistic appreciation of the wonder of human creation. This convergence of perspectives deepens our understanding of the processes involved in human life and strengthens the idea that science and religion can complement each other. The development of understanding human creation from the perspectives of the Quran and scientific science, both manually analyzed and with literature review and QDA miner, has found agreement. The formation of a human embryo begins with the nuṭhfah (zygote) as a result of the combination of sperm (mani) and egg cells (al-ma'al-mudhaf) (Hidayati et al., 2025), which then becomes a clot of blood and becomes mudhghah (a lump of flesh). In this phase, several organs begin to form, such as the eyes, tongue, and lips (Chaabani, 2020). In the fifth week, the heart begins to beat. The embryo has also developed a placenta (Elahian et al., 2014). The following forms are "Izam" and "Lahm," which are interpreted as the stages of development of human body tissues and organs (Sauri & Tanjung, 2025). The final stage is "Ruh". Then an Angel is sent, the "Ruh" is exhaled, and four things are recorded: his sustenance, his death, his deeds, and whether he is lucky or unlucky (Fitriani, 2020). From the QDA Miner analysis, there is a pattern of strong, significant relationships between "embryo" and specific terms, thereby strengthening the connection between the Quran and science in explaining the concept of human creation.

The results of this research contribute to the development of modern science by providing scientific knowledge to clarify and strengthen the understanding of verses of the Quran that are sometimes vague and difficult to understand. Thus, the dichotomy between the Quran and science no longer exists. The Quran and science are a unit that strengthens each other and increases the Quran's scientific literacy. The signal given by the Quran regarding human creation has been proven by scientific research, with laboratory discoveries that make the stages of the human creation process more authentic and concrete, not just statements. The same should be valid for other scientific concepts. The Quran is a stimulus to the development of science, and/or its verses will strengthen discoveries in modern science.

The results of this study provide an overview of the values that can be developed in science education related to human creation. First is the integration of religious knowledge. The results of the study emphasize that modern scientific explanations of embryology, genetics, and developmental biology can be aligned with the narrative of human creation in the Qur'an. Second, in critical thinking and analysis, the study uses a hermeneutic-phenomenological approach and QDA Miner to compare Qur'anic data with scientific findings. This study provides an example of analyzing data from two different sources (religious texts & science), encouraging the ability to evaluate the relationship between scientific and religious concepts, and developing interpretation and logical reasoning skills. Third, in the scientific attitude, the study shows how the scientific process works through observation, experimentation, proof, and verification, and how scientific theories and evidence are developed and validated. The last is Interdisciplinary learning. This study combines biology, embryology, Qur'anic interpretation, educational psychology, and philosophy.

CONCLUSION

This comprehensive analysis combines Quranic and modern scientific perspectives to deepen understanding of human creation. The Quran's description of human creation, including the terms "alami" (earth), "timah" (clay), "hama'in masnun" (black mud), and "salsal" (dry clay), reflects this understanding of depth. The scientific perspective, which emphasizes biological processes such as reproduction, embryonic development, and the formation of the human body, aligns with the explanations in the Quran. QDA Miner software, through data coding and analysis, reveals the high frequency of terms related to the Quran and the scientific perception of human creation. Significantly, this research underscores the compatibility between religion and science in exploring and understanding human creation, and the values of science education, such as integrative, critical, empirical, spiritual, ethical, and interdisciplinary. These findings de-

monstrate that both perspectives can coexist harmoniously, each providing unique insights that contribute to a more complete understanding of human existence and Quranic scientific literacy.

REFERENCES

Agustina, F. D., & Huda, M. N. (2020). Perspective Al-Qurâ€™ an and Biology in Human Creation. *Journal Intellectual Sufism Research (JISR)*, *3*(1), 68-76.

Anggara, D. R., Ridwan, A. M., Arifin, M. K., & Handayani, I. R. (2023). A Study of Al-Alusi's Thought on the Concept of Ruh in Tafsir Ruh Al-Maani. *Ulumul Qur'an: Jurnal Kajian Ilmu Al-Qur'an dan Tafsir*, *3*(1), 43-56.

Arib, J. M., Khairiyah, N., Suryadinata, M., & Mokodenseho, S. (2022). The Inheritance of Human Traits in the Qurâ€™ an Based on the Scientific Interpretation of ZaghlÅ «l RÄ ghib Muá¸¥ ammad an-NajjÄ r. *AL QUDS: Jurnal Studi Alquran Dan Hadis*, *6*(2), 863-886..

Awaluddin, R. Z. S., Zuhri, A., & Rambe, U. K. (2023). Interelasi Teori Evolusi Manusia dan Tafsir Al-Mishbah: Pemahaman Mendalam tentang Penciptaan Manusia. *AL QUDS: Jurnal Studi Alquran dan Hadis*, *7*(3), 549-560.

Ayu, M. L., & Ardi, A. (2021, September). The Relationship Between The Process Of Human Creation Based On The Perspective Of Islam and Science. In *Prosiding Seminar Nasional Biologi* (Vol. 1, No. 1, pp. 878-885).

Badriyah, L., & Miski, M. (2025). The Transmission of Seven Qur'anic Readings in Malang: Networks, Scholarship, and Pedagogical Dynamics. *Mutawatir: Jurnal Keilmuan Tafsir Hadith*, *15*(1), 46-69.

Bollacker, K., Evans, C., Paritosh, P., Sturge, T., & Taylor, J. (2008, June). Freebase: a collaboratively created graph database for structuring human knowledge. In *Proceedings of the 2008 ACM SIGMOD international conference on Management of data* (pp. 1247-1250).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Bungin, B. (2022). *Post-Qualitative Social Research Methods.* Prenadamedia Group.

Chaabani, H. (2020). New insights into the processes of biological evolution and human reproduction provided through a dialogue between science and Qur'an. *International Journal of Modern Anthropology*, *2*(13), 20-66.

Creswell, J. W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.

Dagotto, E., Hotta, T., & Moreo, A. (2001). Colossal magnetoresistant materials: the key role of phase separation. *Physics reports*, *344*(1-3), 1-153.

Davis, M. S. (1971). That's interesting! Towards a phenomenology of sociology and a sociology of phenomenology. *Philosophy of the social sciences*, *1*(2), 309-344.

De Moraes, C. C., de Oliveira Costa, F. H., Pereira, C. R., Da Silva, A. L., & Delai, I. (2020). Retail food waste: mapping causes and reduction practices. *Journal of Cleaner Production*, *256*, 120124.

Deuraseh, N., & Yaakub, N. I. (2010). The development of human embryo in the Quran, surahalmu'minūn (23): 12-14. *European Journal of Scientific Research. W2010*, *48*(1), 155-159..

Ehwanudin, E., Zuniati, M., & Maharani, F. (2021). The Concept of Prenatal Education Aswaja Annahdliyah's Perspective in Shaping the Character of Early Childhood. *Journal of Childhood Development*, *1*(1), 10-20.

Elahian, M., Fattahi, N., & Khademi, M. (2014). Therapeutic Abortion: Ensuring the Health and Survival of Mothers. *Religious Inquiries*, *3*(6), 69-89.

Faradilla, S. (2019). Existence of Pranatal Education in Islam. *Britain International of Linguistics Arts and Education (BIoLAE) Journal*, *1*(2), 210-223.

Fitriani, F., Mardina, V., Fadhliani, & Baiduri, N. (2020, January). Isolation and identification of pathogen fungi in the varieties of local rice, Aceh-Indonesia. In *IOP Conference Series: Materials Science and Engineering* (Vol. 725, No. 1, p. 012070). IOP Publishing.

Hidayati, F., Aliffa, K. N., Candrika, A. R. A., & Lutfiyah, L. N. (2025). INTEGRATION OF QUR'AN INTERPRETATION AND MODERN EMBRYOLOGY: Study of Surah Al-Mu'minūn Verses 12–14. *Al-Ulum Jurnal Pemikiran Dan Penelitian Ke Islaman*, *12*(3), 252-261.

Huang, C., Huang, L., Wang, Y., Li, X., Ren, L., Gu, X., ... & Cao, B. (2023). 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *The Lancet*, *401*(10393), e21-e33.

Husairi, A. (2019, October). Embryology in the qur'an and hadith: expanded multidisiplinary perspective. In *Third International Conference on Sustainable Innovation 2019–Humanity, Education and Social Sciences (IcoSIHESS 2019)* (pp. 459-463). Atlantis Press.

Hussain, S. (1980). The clot (al-'alaq). *Islamic Quarterly*, *24*(3), 107.

Islam, T. O. (2003). In Everything Lies An Evidence: Science and The. *African Culture, Modern Science, and Religious Thought*, 362

Johns, A. H. (2016). Sūrat al-Mu'minūn: A reading and reflection. *Journal of Qur'anic Studies*, *18*(3), 70-90.

Kahn, E. B., Ramsey, L. T., Brownson, R. C., Heath, G. W., Howze, E. H., Powell, K. E., ... & Corso, P. (2002). The effectiveness of interventions to increase physical activity: a systematic review. *American journal of preventive medi-*

cine, *22*(4), 73-107.

Krane, K. S. (2019). *Modern physics*. John Wiley & Sons.

Kloxin, A. M., Kasko, A. M., Salinas, C. N., & Anseth, K. S. (2009). Photodegradable hydrogels for dynamic tuning of physical and chemical properties. *Science*, *324*(5923), 59-63.

Letunic, I., & Bork, P. (2016). Interactive tree of life (iTOL) v3: an online tool for the display and annotation of phylogenetic and other trees. *Nucleic acids research*, *44*(W1), W242-W245.

Mashkoori, A., Kazemian, A., Tabatabaei, S. M., & Kazem, S. (2016). An Analysis of the Opinions of Shia Jurisprudential Authorities Regarding Abortion. *European Online Journal of Natural and Social Sciences: Proceedings*, *5*(3 (s)), pp-258.

Muhamad, A., Syihab, A. H., & Ibrahim, A. H. (2020). Preserving human–nature's interaction for sustainability: Quran and Sunnah perspective. *Science and engineering ethics*, *26*(2), 1053-1066.

Nariman, K., Managheb, S. M., & Arani, R. A. (2020). A Comparative Study of Human Creation from the Perspective of the Holy Qur'an and Science and Criticizing the Misconceptions. *Quran and Religious Enlightenment*, *1*(2), 153-173.

Noyori, R. (2002). Asymmetric catalysis: science and opportunities (Nobel lecture). *Angewandte Chemie International Edition*, *41*(12), 2008-2022.

Nurbayan, Y. (2019). A Semantic Analysis of Words "Khalaqa, Ja'ala, Bada'a, Shana'a, Fathara" In Revealing the Concept of Human Creation. *Arabiyat: Jurnal Pendidikan Bahasa Arab dan Kebahasaaraban*, *6*(2), 288-301.

Pakravan, N., & Motaharipour, M. (2019). The role and influence of the mother in the development of the fetus: Comparative study of Qur'an, Hadiths, and modern medical perspectives. *Journal of religion and health*, *58*(1), 195-205.

Parwanto, W. (2023). Corruption In The Quran: Causes, Sanctions, and Alternative Solutions Based on The Quran. *Darul Hikmah: Jurnal Penelitian Tafsir dan Hadits*, *9*(1), 111-122..

Peirce, J., Gray, J. R., Simpson, S., MacAskill, M., Höchenberger, R., Sogo, H., ... & Lindeløv, J. K. (2019). PsychoPy2: Experiments in behavior made easy. *Behavior research methods*, *51*(1), 195-203.

Peng, J., Gao, W., Gupta, B. K., Liu, Z., Romero-Aburto, R., Ge, L., ... & Ajayan, P. M. (2012). Graphene quantum dots derived from carbon fibers. *Nano letters*, *12*(2), 844-849.

Qibty, A. S., & Hamidi, N. H. B. M. (2022). The Hadith's View on the Phases of Embryo Development in the Womb: Study of Takhrij Hadith with Medical Science Approach. *Journal of Takhrij Al-Hadith, 1*(2).

Rahman, S. M. H. S. A., Azhar, M. H. M., Sa'ari, C. Z., Abidin, M. S. Z., & Ilias, M. Z. (2023). The basic model of Islamic psychospiritual treatment based on understanding and appreciating the concept of destiny (Al-Taqdir). *Journal for the Study of Religions and Ideologies*, 185-197.

Rame, G. R. (2014). Hermeneutika fenomenologis paul ricoeur. *Missio Ecclesiae*, *3*(1), 1-16.

Rebitzer, G., Ekvall, T., Frischknecht, R., Hunkeler, D., Norris, G., Rydberg, T., ... & Pennington, D. W. (2004). Life cycle assessment: Part 1: Framework, goal and scope definition, inventory analysis, and applications. *Environment international*, *30*(5), 701-720.

Reynolds, G. S. (2020). *Allah: God in the Qur'an*. Yale University Press.

Sarikhani, A., Doroh, H. M., & Eslaminia, Q. (2020). A comparative study of the time of ensoulment in Islam and other religions. *Comparative Studies on Islamic and Western Law*, *7*(1), 119-140.

Snijders, H. (2014). Philosophical Anthropology and Human-Technology Relations (191612660) Final Paper Technology as Experience: the R100GSPD.

Sulaiman, T. A., Yusuf, A., Abdeljabbar, A., & Alquran, M. (2021). Dynamics of lump collision phenomena to the (3+ 1)-dimensional nonlinear evolution equation. *Journal of Geometry and Physics*, *169*, 104347.

Suri, N., & Tanjung, M. (2025). Metaphor and Symbolism in the Language of the Quran: A Linguistic Study on the Concept of Tauhid (Analysis of Surah al-Fatihah). *Pharos Journal of Theology*, *106*(1).

Sururi, A., Kuswanjono, A., & Utomo, A. H. (2020). Ecological sufism concepts in the thought of Seyyed Hossein Nasr. *Research, Society and Development*, *9*(10), e5769108611-e5769108611.

Talebe, T., Harun, H., & Sabir, M. (2020, September). Nutritional Intake of Fetus in Pregnancy in Medical and Koran Perspective: A Literature Review. In *Proceedings of The International Conference on Environmental and Technology of Law, Business and Education on Post Covid 19, ICE-TLAWBE 2020, 26 September 2020, Bandar Lampung, Indonesia* (pp. 81-88). EAI.

Turrentine, F. E., Dreisbach, C. N., St Ivany, A. R., Hanks, J. B., & Schroen, A. T. (2019). Influence of gender on surgical residency applicants' recommendation letters. *Journal of the American College of Surgeons*, *228*(4), 356-365.

Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, *15*(3), 398-405.

Vitiello, B., & Stoff, D. M. (1997). Subtypes of aggression and their relevance to child psychiatry. *Journal of the American Academy of Child & Adolescent Psychiatry*, *36*(3), 307-315.

Wahid, W. M. A., Shintia, P. M., Zulaiha, E., & Taufiq, W. (2026). Analysis of Special Methods and Sources of Tafsir in Tafsir Al-Mizan in Surah Al-Qari'ah by Muhammad Husain Thabathaba'i. *al-Afkar, Journal For Islamic Studies*, *9*(1), 1015-1029.