

MARIE CURIE: A PSYCHOBIOGRAPHY

A treatise submitted in partial fulfilment of

the requirements for the degree of

MASTER OF ARTS

in

Counselling Psychology

of

RHODES UNIVERSITY

by

ELMERET ROETS

Supervisor: Prof. Roelf van Niekerk

July 2015

### Abstract

While researchers debate the value of psychobiographical research, interest in this area is growing on a national and international basis. Every year, the number of psychobiographical studies at universities in South Africa is growing. Psychobiographical research is qualitative research that utilises psychological theory to explore and describe the lives of extraordinary individuals. The primary aim of this psychobiography was to examine the life of Marie Curie (1867–1934) by employing developmental psychologist and psychoanalyst Erik Erikson's (1959) theory of psychosocial personality development. Marie Curie was chosen as the research subject because of the researcher's personal interest and the subject's prominence as a female scientist. She was a Polish-born and naturalised French scientist who conducted pioneering research on radioactivity. Marie Curie's ground-breaking discoveries changed the way scientists think about matter and energy and introduced a new era in medical knowledge and the treatment of disease. Her life exemplifies a love of science, commitment, and perseverance. Data were collected from several primary and secondary sources on Marie Curie's life. The researcher developed a data-collection and analysis matrix to facilitate the systematic collection of data and analysis according to Erikson's stage theory of psychosocial personality development. This psychobiography suggests that unresolved infantile and early childhood crises gave rise to personality traits that eventually contributed to Curie's extraordinariness. In the case of Curie, personality traits that are often regarded as atypical or malignant, ironically encouraged perseverance, creativity, and productivity. This study complements the psychobiographical studies done in South Africa on extraordinary individuals. It demonstrated the value of psychobiographical research as a teaching instrument, revealed the usefulness of Erikson's theory, and illustrated the uniqueness of individuals.

Key words: case study, Erik Erikson, identity, Marie Curie, psychobiography, psychosocial personality development.

Student number: g13r7773

Declaration

I declare that MARIE CURIE: A PSYCHOBIOGRAPHY is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references and that this work has not been submitted for any other degree at any other institution.



---

SIGNATURE

(Elmeret Roets)

12 October 2015

---

DATE

## Acknowledgements

I should like to express my sincere gratitude to the following people, who made this research undertaking possible:

My supervisor, Professor Roelf van Niekerk, whose maddening, often tear-provoking attention to detail drove me to learn finally the difference between active and passive voice, how to write more concisely, and how to punctuate text. Above all, thank you for introducing me to the field of psychobiographical research, and for your time, immense patience, encouragement, and guidance throughout this process.

My hard-working parents, Frik and Valmari Roets, who have encouraged and supported me unconditionally throughout my endeavours. Thank you for listening to me while amiably smiling and nodding.

My fiancé, Andreas Venhorst, who kept a sense of humour when I had lost mine. Thank you for entertaining my histrionics while pouring a glass of wine. *Ich liebe dich, mehr als gestern, weniger als morgen.*

My uncles, Leon and Marius Koenig, for financial aid over the past years.

And finally, Minka, although she can't possibly know how much of a help she has been [yes, I thanked my cat!]. Thank you for keeping me company while toiling (or procrastinating), and regularly obscuring the screen, reminding me that there is life beyond thesis writing.



*Figure 1.* A Portrait of Marie Curie, 1903 (Wikimedia.org, n.d.)

## Table of Contents

Abstract .....	ii
Declaration .....	iii
Acknowledgements .....	iv
Table of Contents .....	vi
List of Figures .....	ix
List of Tables .....	x
<b>CHAPTER 1 - INTRODUCTION</b> .....	1
1.1 Chapter Preview .....	1
1.2 Primary Aim of the Research Study .....	1
1.3 The Psychobiographical Approach .....	1
1.4 Personal Passage .....	3
1.5 Theoretical Framework .....	3
1.6 Life of Marie Curie .....	5
1.7 Data Collection .....	8
1.8 Structural Overview of the Treatise .....	8
1.9 Chapter Summary .....	9
<b>CHAPTER 2 - OVERVIEW OF PSYCHOBIOGRAPHICAL RESEARCH</b> .....	10
2.1 Chapter Preview .....	10
2.2 Definition and Description .....	10
2.3 A Brief History and Timeline of Psychobiographical Development .....	14
2.4 The Value of Psychobiography .....	17
2.5 Criticisms of Psychobiography .....	20
2.6 Chapter Summary .....	20
<b>CHAPTER 3 - ERIKSON'S THEORY OF PSYCHOSOCIAL DEVELOPMENT</b> ..	21
3.1 Chapter Preview .....	21
3.2 Foundation and Features of Erikson's Theory .....	21
3.3 The Eight Psychosocial Stages of Development across the Human Lifespan .....	24
3.3.1 Stage 1: Basic Trust versus Mistrust .....	24
3.3.2 Stage 2: Autonomy versus Shame and Doubt .....	26
3.3.3 Stage 3: Initiative versus Guilt .....	27

3.3.4	Stage 4: Industry versus Inferiority.....	28
3.3.5	Stage 5: Identity versus Role Confusion.....	29
3.3.6	Stage 6: Intimacy versus Isolation .....	31
3.3.7	Stage 7: Generativity versus Stagnation .....	32
3.3.8	Stage 8: Integrity versus Despair .....	33
3.4	Criticism and Praise of Erikson's Theory .....	34
3.5	Chapter Summary .....	35
<b>CHAPTER 4 - METHODOLOGY.....</b>		<b>37</b>
4.1	Chapter Preview .....	37
4.2	Research Aims .....	37
4.3	Research Design.....	37
4.4	Sampling .....	38
4.5	Data Collection .....	38
4.6	Data Processing and Data Analysis .....	39
4.6.1	Data Reduction.....	39
4.6.2	Data Display.....	40
4.6.3	Conclusion Drawing and Verification .....	40
4.7	Methodological Challenges .....	42
4.7.1	Explicit Subjectivity.....	42
4.7.2	Analysing an Absent Subject .....	42
4.7.3	Cross-Cultural Differences .....	43
4.7.4	Reductionism .....	43
4.7.5	Trustworthiness of Data.....	44
4.7.6	Elitism and Easy Genre.....	45
4.7.7	Inflated Expectations .....	46
4.7.8	Ethical Considerations .....	46
4.8	Reflexivity.....	47
4.9	Chapter Summary .....	48
<b>CHAPTER 5 - RESEARCH FINDINGS AND DISCUSSION.....</b>		<b>49</b>
5.1	Chapter Preview .....	49
5.2	Research Findings and Discussion.....	49

5.2.1	Childhood (1867–1880).....	49
5.2.2	Adolescence and Early Adulthood (1880–1888).....	62
5.2.3	Adulthood (1888–1927).....	68
5.2.4	Final Years (1927–1934) .....	85
5.3	Chapter Summary .....	88
<b>CHAPTER 6 - CONCLUSIONS, LIMITATIONS, VALUE, AND RECOMMENDATIONS.....</b>		<b>90</b>
6.1	Chapter Preview .....	90
6.2	The Aims of the Study Revisited .....	90
6.3	Summary of the Research Findings .....	90
6.4	The Values and Limitations of the Study .....	93
6.4.1	The Value of Psychosocial Personality Development .....	93
6.4.2	The Limitations of Psychosocial Personality Development .....	94
6.4.3	The Value of Psychobiographical Case Study Research. ....	94
6.4.4	The Limitations of Psychobiographical Case Study Research .....	95
6.4.5	The Values of the Psychobiographical Subject .....	97
6.4.6	The Limitations of the Psychobiographical Subject .....	97
6.5	Recommendations for future research .....	98
6.6	Chapter Summary .....	99
References .....		100
Appendix A. Photographs Depicting Curie’s Life.....		118
Appendix B. Major Accomplishments, Awards, Honours, and Tributes Curie Achieved .....		124
Appendix C. A Timeline of the Significant Periods in Curie’s Life in Relation to Erikson’s Eight Stages of Psychosocial Development .....		127
Appendix D. A Timeline of Curie’s Life Events and Accomplishments in Relation to Erikson’s Eight Stages of Psychosocial Development .....		129



## List of Figures

Figure 1. A Portrait of Marie Curie. ....	v
Figure 2. Marie Curie, aged 16 .....	118
Figure 3. Wedding photo of Marie and Pierre Curie. ....	118
Figure 4. Pierre and Marie Curie on their honeymoon bicycle trip in 1895.....	119
Figure 5. Pierre and Marie Curie in the shed at l'Ecole de physique et chimie industrielles in Paris, France, where they made their discoveries in 1898.....	119
Figure 6. Marie Curie and her daughters in 1905. ....	120
Figure 7. The daily Excelsior article in which the contested Marie's candidacy for the French Academy with scandalous and racist claims in 1911. ....	120
Figure 8. Marie Curie and four of her students (n.d.). ....	121
Figure 9. Photograph of the first Solvay conference in 1911. ....	121
Figure 10. Marie Curie and her daughter Irène at the Hoogstade Hospital in Belgium, in 1915.....	122
Figure 11. Marie operating a mobile X-ray unit during World War I. ....	122
Figure 12. Marie Curie in the laboratory at the Radium Institute during her final days. ....	123
Figure 13. Marie Curie with President of the United States, Warren G. Harding, head of the procession down the stairs of the White House after the ceremony in 1921.....	123

## List of Tables

Table 1. Psychobiographies Presented at South African Universities. ....	16
Table 2. Psychobiographical Development Over Time. ....	18
Table 3. Erikson's Eight Stages of Psychosocial Development. ....	25
Table 4. Primary and Secondary Sources Used. ....	39
Table 5. Data-Collection and Analysis Matrix. ....	41
Table 6. A Structural Outline of the Findings of this Study .....	50

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Chapter Preview**

This introductory chapter presents a general overview of the context, the primary aim of the research, an overview of the psychobiographical approach, a brief review of the researcher's personal journey, a summary of the theoretical framework, a review of Madame Marie Curie's legacy, a brief description of the method of data collection and analysis, as well as an outline of the structure of the thesis.

#### **1.2 Primary Aim of the Research Study**

Madame Marie Curie (1867–1934), subsequently referred to as Curie, was chosen as the research subject for this study. Curie is considered one of the most influential scientists of the 20th century (Ogilvie, 2004). The study's primary objective was to describe and interpret Curie's psychosocial development by using Erik Erikson's (1959) theory of psychosocial development. The secondary objective was to evaluate Erikson's theory in terms of its applicability and appropriateness to Curie's personality development. Moreover, it aimed to contribute towards the growing number of psychobiographical studies in South Africa. McAdams (2000) asserted that psychobiographical studies offer a significant way of capturing the essence of human life.

#### **1.3 The Psychobiographical Approach**

Curie's anecdotal response to a reporter's enquiry once was, "Be less curious about people and more curious about ideas" (Fadiman & Bernard, 2000, p. 150). Ironically, psychologists are particularly interested in and curious about people. The researcher employed a psychobiographical approach to studying the life of Curie. McAdams (2000) defined psychobiographical research as the "systematic use of psychological theory to transform a life into a coherent and illuminating story" (p.730). Psychobiographical research is categorised as a form of life history research, which involves the application of a particular theoretical framework to a subject's life and allows the researcher to describe and interpret the life (Runyan, 1983). Therefore, the researcher explores the subject's life with the intention to reveal and reconstruct the life psychologically (Fouché & Van Niekerk, 2010).

Psychobiographical research typically employs a single-case research design (Fouché, 1999). Researchers use case studies to describe, explain, and interpret lives. Psychobiographical research usually focuses on historical figures whose lives are regarded as significant (McAdams, 2006).

Psychobiographical research is characteristically morphogenic. In other words, it emphasises how traits and personality variables combine in different ways to determine the uniqueness of individuals (Allport, 1937). As a result, psychobiography is person-centred and allows for holistic descriptions and interpretations of individuals' uniqueness and their subjective experiences. Therefore, psychobiographical research is exploratory–descriptive in nature. It provides an in-depth exploration and thick description of individual lives within their particular socio-historical contexts (Fouché & De Vos, 2005; McAdams, 1994; Neuman, 2006; Yin, 2006). Bromley (1986) noted that interesting facets of individuals rely on their contexts to a degree that becomes restrictive to generalise to the community.

Researchers consider psychobiography valuable for several reasons. It provides a very efficient and flexible tool for the assessment, development, and improvement of psychological theories, which support knowledge and theory building (McAdams, 1988, 1994; McLeod, 1994; Yin, 1994). Although psychobiographical research contributes to the advancement of psychological theories, it is particularly useful in the sub-discipline personality psychology. It allows the researcher to address fundamental questions of personality development at particular points during individuals' lives and across their entire life span. It also shows whether the theory is applicable to similar cases. Alexander (1988), Carlson (1988), and Runyan (1982b) all recognised and advocated these values of studying individual lives, since individual lives are rich in personality and reflect developmental and psycho-historical importance. Welman (2009) held that because psychobiographical research aims to gain insight into the intricacies of the human personality, it captures the spirit of psychology.

Psychobiographical research is one of the leading fields where a researcher pursues an in-depth understanding of individual lives and examines the relationship between data and general theory. Psychobiographers typically focus on intricate, creative, and sometimes contradictory lives because they are predominantly concerned with improving the understanding of different people and their lives, and by extension, societal knowledge (Schultz, 2005).

## **1.4 Personal Journey**

Researchers' understanding, judgement, and biases tend to influence interpretation in psychobiographical studies. The study, therefore, requires consideration, understanding and articulation of the investigator's points of departure, predisposition, and bias.

Initially Curie's scientific life and years of painstaking research with the obstacles she had to overcome sparked my interest. Particularly as she later paid for her discovery of radium with her life. During my pursuit to examine Curie's life, I felt privileged to rediscover all aspects of Curie's life that finally led to her life's work. During this passage, I was pleased to learn that discovery is a matter of passion and persistence. While my understanding of Curie as an individual grew significantly, I found myself fortunate to be able to discover in her the same desire for knowledge that drives creative individuals. I found Curie's life inspirational, and believe that others in pursuit of their dreams will also find this life story inspirational.

## **1.5 Theoretical Framework**

Erik Erikson (1902–1994) was an ego psychologist who formulated one of the most prevalent and influential theories of development. While Sigmund Freud's work influenced Erikson's, the latter's theory focused on psychosocial development instead of psychosexual development. Ego identity is one of the central features of Erikson's (1959) psychosocial stage theory. Ego identity is the conscious sense of self that individuals develop through social interactions and relationships. Erikson (1959) held that individuals' ego identities are continually changing owing to new experiences and information acquired through daily interactions with others. As individuals are confronted by each developmental stage, they face new challenges that potentially further or hinder the development of their identities. Identity refers to the ideals, beliefs, and values that form and guide a person's behaviour. Identity formation begins in childhood and becomes particularly important during adolescence, yet it is a process that continues throughout life. Identity gives individuals an integrated and cohesive sense of self that endures and continues as they age (Erikson, 1950, 1959).

Erikson's (1959) theory of psychosocial development differentiates eight developmental stages through which developing humans may pass during their lifespan. Erikson used the epigenetic principle to describe the emergence of different characteristics as they appear during certain ages. This emergence of characteristics happens in a particular, genetically determined sequence. This sequence unfolds in a way that indicates that individuals are continuously

developing as a whole, in both noticeable and unnoticeable ways (Erikson, 1950). During each stage, individuals are confronted with a new psychological crisis to master. The psychological crises arise from conflicting forces that are based on changes in biological, psychological, and social processes. If individuals successfully master these crises, they gain a corresponding virtue. Each stage builds on the successful resolution of earlier stages. If individuals do not complete the challenges of stages successfully, they may reappear as difficulties in the future. Erikson (1963) noted that the eight crises could arise at any time in individuals' lives because of specific psychosocial forces, which he named "hazards of existence" (p. 274). Mastery of a stage is not necessary to advance to the next phase, and all possible psychosocial crises could appear in all ages. For instance, later stages can be predominant in early life, and earlier stages revisited in later life. Each stage has a general development that describes an average individual's development through the different stages. However, the interaction between people and the environment could augment individual differences in these developmental progressions (Sneed, Whitbourne, & Culang, 2006).

The researcher selected Erikson's (1959) theory for several reasons. Firstly, Erikson assumes a holistic approach that recognises the influences of culture and identity of individuals (Slater, 2003). The researcher considered Erikson's theory suitable because it would assist in gaining a holistic conception of Curie's life, which would include and identify the social, cultural, and historical aspects that influenced her life. Secondly, Erikson was more interested in psychological health and human potential, and less in pathology (Maier, 1988; Slater, 2003). The researcher considered Erikson's theory fit to elicit Curie's individual characteristics that encouraged or challenged her undertakings. Thirdly, a fair amount of research supports Erikson's ideas, especially identity studies (Corsini & Marsella, 1983; Meyer, Moore, & Viljoen, 2008). Therefore, Erikson's validated and recognised theory was pertinent to study Curie's psychosocial personality development. Fourthly, Erikson's theory reflected the era in which he lived (Douvan, 1997). Curie and Erikson lived during the same era, which reflects the same morals, values, and socio-historical events that make the application of his theory even more fitting. Lastly, not only is Erikson's theory popular under psychobiographers and widely used in South African studies, but Erikson was a celebrated psychobiographical author himself.

## 1.6 Life of Marie Curie

The researcher selected the subject via purposive sampling. From a psychobiographical point of view, Curie's life offered intricate and multidimensional facets which could assist psychobiographical researchers to gain a better understanding of Erikson's theory, and to integrate the theory with real life. Curie was a famous and enigmatic figure who made a substantial contribution to society. She is one of the most famous female scientists of all time (Marie Curie, 2015). Curie is also considered the "Mother of Modern Physics" (Lewis, 2015). She did novel research in nuclear physics and cancer treatment with her discovery of radium. Curie also endured several hardships throughout her life and lived in a time of oppression, prejudice, and war. The researcher considered her complex life experiences and exceptional achievements fitting for psychobiographical study.

The woman, who became known as Madame Marie Curie, was born Maria Salomea Skłodowska on 7 November 1867, in Warsaw, the capital of Poland. She was the youngest of the five Skłodowski children and began her early life and education under the oppressive regime of the Tsar of Russia (Quinn, 1995). Curie was a talented student with a prodigious memory, renowned for immersing herself in books (Quinn, 1995). Before the age of 12, Curie lost her eldest sister to typhus and her mother to tuberculosis. While dealing with these losses, Curie graduated at the age of 15 from high school with top honours (Goldsmith, 2005).

At the time, the University of Warsaw did not allow women to study, which led Curie and her sister to seek further education in Paris. The sisters agreed to support each other financially to enable them to study at the Sorbonne in Paris. Curie worked as a governess and tutor for five years to help fund her sister's studies. Her sister would later reciprocate the same favour (Curie, 1937). Living under oppression, Curie rebelled in subtle ways. While working as a governess she secretly taught a small group of underprivileged village children. Towards the end of the five-year period, she studied at a secret establishment, named the *Flying University*. She also gained access to an illegal teaching laboratory for Polish scientists (Curie, 1923).

At the age of 24, Curie enrolled at the University of Paris, also known as the Sorbonne. In 1893, Curie finished a master's degree in physics. She started working in an industrial laboratory while continuing to study at the Sorbonne. With the aid of a fellowship, Curie earned a master's degree in mathematics in 1894. The Society for the Encouragement of National Industry then commissioned Curie to research the magnetic properties of various steels. She

needed to find a laboratory where she could do the research. This requirement led a colleague to introduce her to French physicist Pierre Curie, whom she later married (Ogilvie, 2004).

After completing her work for the Society for the Encouragement of National Industry, she required a topic for a doctoral thesis, a feat no woman had yet achieved. Curie became interested in the work of French physicist Henri Becquerel, who discovered that uranium emitted rays. During her research, Curie postulated that radiation was an atomic property, which transformed forever how humankind would view the atom (Pasachoff, 1996). She also coined the term *radioactivity* (Curie, 1937). Pierre put aside his work on crystals and joined Curie in her research on radiation. They did most of their research in an inadequately equipped glass shed under austere conditions. In 1898, their perseverance led to the discovery of two new elements, polonium and radium. Curie completed her thesis in 1902 and was the first woman to earn a doctorate in Europe. In 1903, the Academy of Sciences awarded Curie, along with husband Pierre and Henri Becquerel, the Nobel Prize in Physics, for their work on radioactivity. She became the first woman to receive a Nobel Prize. The Nobel Prize made the Curies famous, especially within France (Curie, 1937, Emling, 2012).

In 1906, Pierre was killed in a road accident, leaving Curie a widow with the responsibility of raising two young daughters, Irène and Eve. The French government offered Curie a pension, but she declined the offer and continued to earn a living through independent research. Following Pierre's death, Curie accepted his physics professorship at the invitation of the Sorbonne, making her the university's first female faculty member and first female professor (Goldsmith, 2005). Critics continued to postulate that radium was not an element, which threatened the entire science of radioactivity. However, Curie continued her research, determined to isolate pure radium and polonium, to remove any remaining doubts about the existence of the two elements. In 1910, Curie published *A Treatise on Radioactivity*, which led the Academy of Sciences to award her the Nobel Prize in Chemistry in 1911. Curie became the first scientist, and woman, to win two Nobel Prizes in two diverse scientific areas. Some critics believed that Pierre had performed their earlier research and that Curie's contribution was only as his assistant. Curie's later writings made it clear that even though she and Pierre collaborated, the discoveries were her own (Curie, 1923; Ogilvie, 2004; Quinn, 1995). The critiques were partly due to the prejudices of the time, xenophobia and sexism. Masculine views also prevented Curie from entering the Academy of Sciences in 1911 (Quinn, 1995). To aggravate matters, it



became public that Curie was having an affair. The press attacked her for not abiding by the conventions of a French marriage (Quinn, 1995).

When World War I began in 1914, Curie devoted her time and resources to help the cause. Curie set up mobile and stationary X-ray service stations in the battle zones. Within the first two years of the war, Curie had established 200 X-ray units throughout France and Belgium (Ogilvie, 2004). The use of X-rays enabled doctors to find the precise location of bullets and examine shattered bones, preventing countless amputations, and saving lives. Researchers estimate that over one million wounded soldiers received treatment with the aid of X-ray units. Curie further established a school to train female radiology technicians. The school is today known as the Curie Institute. After the war Curie wrote a book, *Radiology and War*, which showed how scientific research could save human lives and relieve suffering (Quinn, 1995).

Curie's attention turned to raising funds for the establishment of a radium institute. In 1921, an American journalist named Missy Meloney, heard about Curie's efforts. She proposed that Curie tour the United States of America (USA) to make her mission known to the public. Accompanied by her two daughters, Curie sailed to the USA. During her visit, President Warren G. Harding presented Curie with a gram of radium, bought as a result of a collection among American women. Curie returned home with enough radium to equip the Radium Institute in Paris. In 1928, Curie appealed to Missy Meloney a second time. Curie explained that she needed another gram of radium, this time for the Polish Radium Institute in Warsaw. In 1929, Curie travelled again to America to accept a second gram of radium for the establishment of the Warsaw Radium Institute (Curie, 1923).

Although the dangers of radiation are well known and understood today, many of the early researchers who examined these radioactive elements, did so with little or no protection. Curie was among them, ignorant of the effect of radioactivity on human health. She was renowned to carry test tubes of radium in the pockets of her lab coat. Even today, most of Curie's notebooks are still so radioactive that researchers cannot handle them without protection (Pasachoff, 1996). At the end of the 1920s, Curie began to suffer from exhaustion, light-headedness, and a low-grade fever. She also experienced a constant droning in her ears and a gradual loss of eyesight due to cataracts. In the early 1930s Curie's health continued to decline. In 1934, Curie retired to the sanatorium of Sancellemoz in France, hoping to recuperate. On 4 July Curie died at the sanatorium of malignant anaemia, believed to be a consequence of her work with radioactive substances (Curie, 1937; Ogilvie, 2004).

In 1995, Curie and Pierre's remains were entombed in the Panthéon in Paris, the final resting place of France's greatest minds. Curie became the first and only woman to be laid to rest there. Curie received several awards, honours, and tributes during and after her life. Across the world, structures, institutions, universities, public places, roads, and museums bear her name. Numerous works of art, books, biographies, films and plays tell the story of her life and work (Curie Institute, Paris, 2014).

### **1.7 Data Collection**

The researcher collected data on Curie's life from various data sources. These include primary documents, produced by the subject, and secondary sources, produced by other authors (Elms, 2007; Simonton, 2003). The researcher developed a data collection and analysis matrix to facilitate the systematic data collection process (Yin, 2009). Documentation of the complete range of data sources increases the study's dependability during the data collection phase (Fouché, 1999; Yin, 2006). Published data constitute stable resources, which researchers can review frequently and repeatedly, and also allow for cross-referencing of biographical information (Rudestam & Newton, 2007).

### **1.8 Structural Overview of the Treatise**

The treatise consists of six chapters. Chapter 1 provides a general orientation to the reader. Chapter 2 defines psychobiography as a research method. It offers a definition and description of the different paradigms, followed by a brief history and timeline of psychobiographical development. The chapter concludes with considerations pertaining to the value and criticisms of psychobiographical study. Chapter 3 focus on Erik Erikson's (1959) theory of psychosocial development across the human lifespan. It briefly describes the underpinning of Erikson's theory and its central features. It also includes a description of the eight stages and the possible outcomes of each stage. The chapter closes with particular criticisms and commendations of Erikson's theory. Chapter 4 focuses on the methodological considerations of the study. It also pays attention to the challenges, ethical concerns, and reflexivity of the researcher. Chapter 5 presents and discusses the relevant research findings derived from an examination of Curie's life. The researcher structured the chapter according to the data collection and analysis matrix, as presented in Chapter 4. Chapter 6 concludes the

research with a discussion of the value of the study, specific limitations, and recommendations for future studies.

### **1.9 Chapter Summary**

This chapter served as an introduction to the study. The primary aim and concept of psychobiographical study was presented. A brief reflection on the researcher's personal passage followed. Subsequently, the reader was familiarised with the theoretical framework, research subject, and method of data collection and analysis. Finally, a structural overview of the thesis concluded the chapter.

## **CHAPTER 2**

### **OVERVIEW OF PSYCHOBIOGRAPHICAL RESEARCH**

#### **2.1 Chapter Preview**

This chapter contextualises psychobiography as a research method and genre within research psychology. It offers a definition and description of psychobiography, followed by a brief historical overview and timeline of psychobiographical development during the past century. Various features of psychobiographical research, which add value to the field of psychology, are discussed. The chapter concludes with a brief critique of psychobiographical research.

#### **2.2 Definition and Description**

The term ‘psychobiography’ is derived from the terms ‘psychology’ and ‘biography’. Roberts (2002) noted that both psychologists and biographers are interested in life stories and life history, and utilise biographical data in their research (e.g., diaries, letters, autobiographies, and journals). However, psychology is a scientific discipline that emphasises empirical proof, and uses theoretical models to conceptualise behaviour and development (Howe, 1997). Biography, on the other hand, emphasises individuality and uniqueness, rather than the commonalities between people. It therefore requires a more subjective and intuitive approach (Van Niekerk, 2007). Although this interdisciplinary relationship between psychology and biography was characterised by Elms (1994) as an uneasy one, both fields have recognised a coalition that has mutual benefits: psychobiographers increasingly argue that as much as psychology promotes biography, biography improves psychology (Jolly, 2001).

Over the years, academics have defined psychobiographical research in many different ways. For instance, Runyan (1982b) described it as “the explicit use of systematic or formal psychology in biography” (p. 202). According to Carducci (2009), psychobiography seeks to understand historically significant individuals through the application of psychological theory and research of biographical data. Schultz (2005) held that the aim of psychobiography is to understand people’s uniqueness and “how they function and come to be irrespective of any reference group” (p. 4). Although there are various definitions, most share the acknowledgement of both a biographical description of the individual’s life history and accomplishments, as well as

a psychological interpretation of the life. Several facets are central to psychobiographical study as a research method, and are described below.

In 1993, Silverman noted, “Without theory there is nothing to research” (p. 1). This statement accentuates the role of theory in providing a framework to guide the interpretation of the biographical data. Psychobiographical study utilises theory as an interpretive framework to guide the researcher. General psychological theories inform the biographer in the understanding of the chosen research subject. Therefore, psychobiographical research entails a methodical and descriptive study of individuals within their social historical contexts, using psychological theories or frames of reference (Van Os, 2008).

As a descriptive study, which is concerned with the meaning and quality of lived experiences, psychobiography is regarded as qualitative research. Researchers that conduct qualitative research, do so with the notion that one cannot have an objective conceptualisation of the world, without subjective personal meaning and experience of the subject. It therefore places importance on hermeneutics, which denotes the subjective interpretation of the subject’s life text. Hermeneutics also recognises the cultural and social context of the life studied (Barbour, 2001; Elms, 1994; Ponterotto; 2005; Willig, 2008). Because of this interest in individuals’ subjective and private significance and/or experiences, qualitative researchers may also focus on documents instead of individuals (Ponterotto, 2010). Qualitative methods, such as interviews and observations, enable researchers to get closer to the individual’s perspective. These rich descriptions, or what Geertz referred to as “thick descriptions” of the social world, are valuable in understanding the social context and individuals within the context (1973, p. 6). Consequently, psychobiography explores all dimensions of the individual’s life qualitatively, subsequently providing insights or truths that are socially, historically, politically, and/or morally constructed (Denzin & Lincoln, 2003; Edwards, 1998).

Within the qualitative paradigm, the psychobiographer has a morphogenic, single- case approach, which focuses on the specifics of the case. A case study is regarded as a systematic tool that focuses on a single unit. It therefore inspects, demonstrates, and considers the complexities of one specific individual at a time. Case study research is synonymous with rich empirical descriptions of an individual’s experience and perspectives, retrieved from a multiplicity of sources. Sources may include conversations, archival sources, oral or written reports, observations, or artefacts (Runyan, 1982b; Yin, 2009). Runyan (1983) regards case study research as a method to arrange and integrate a large amount of idiographic information

about an individual and his or her social context. Case study research, and by extension psychobiography, often implies that the chosen subject is atypical or unlike the norm.

This divergence leads to the centrality of the extraordinariness of the individual in psychobiography. The aim of psychobiographical research is to provide a psychological interpretation of an exemplary and finished human life, particularly the life of an astonishing or controversial person (Carlson, 1988; Schultz, 2005). These individuals are described as “renowned, enigmatic, exceptional, or even contentious” (Fouché & Van Niekerk, 2010, p. 496). Gaining knowledge about different, unusual individuals or lives, develops an understanding of human nature, leads to more careful predictions and generalisations, and makes psychological practice more accurate (Sokolovsky, 1996). Consequently, psychobiography inspects and analyses the development of originality, innovation, ingenuity, and efficiency in extraordinary individuals.

When researchers examine an (extraordinary) individual’s life, they should observe and analyse personality as a single entity (Allport, 1937). Therefore, in research, instead of focusing on general laws, the focus should be on detailed and different patterns of people's lives. As early as 1898, the terms ‘idiographic’ and ‘nomothetic’ were introduced to American psychology by Hugo Münsterberg (Hurlburt & Knapp, 2006). The idiographic approach proposes that every person is different from another and attempts to understand the unique aspects of a particular individual. The nomothetic approach recognises ordinary virtues or general rules that can be applied to many different individuals or to specific groups (Allport, 1937). To demonstrate the different ways to study a subject, the difference between idiographic and nomothetic conceptualisations were defined (Allport, 1937; Runyan, 1988c). However, the idiographic approach received some criticism owing to its diverse ordering of what is specific and what is general, devoid of a reasonable explanation of the uniqueness of the whole person (Runyan, 1983). In response, Allport replaced the term ‘idiographic’ with ‘morphogenic’, which denotes the study of different patterning processes of the whole personality. It places emphasis on the uniqueness of the entire person, rather than the uniqueness found in separate elements. The result is that researchers recognise psychobiography as a morphogenic approach, which identifies the individuality of people, and provides a unique and holistic description of the individual (Carlson, 1988; Elms, 1994).

To aid a holistic description of the individual under study, psychobiography entails a longitudinal study that explores and describes a person’s entire life course. It provides

psychobiographers with ideal opportunities to trace the personality development of the individual in a longitudinal fashion (Fouché & Van Niekerk, 2005; Runyan, 1982b). Psychobiographical study endeavours to provide a lifespan perspective of a complete life, with the aim to differentiate, reveal, or define the entire central life story, through transforming it into a rational and enlightening account (McAdams, 1988; Schultz, 2005).

To support psychobiographers' aim to provide coherent and clarifying interpretations of lived lives, psychobiography allows for both inductive and deductive approaches (Edwards, 1998). The inductive approach moves from specific observations to broader generalisations and theories. The researcher begins with careful observations and measures to detect patterns and regularities. Tentative hypotheses are then formulated and further explored to reach conclusions. In contrast, the deductive approach moves from the more general to the more specific. The researcher begins with a theory about the interested subject, and then narrows it down to more specific hypotheses to be tested. It then is narrowed down further through the collected data to address the hypotheses, which finally leads to confirmation or disproof of the original theory (Trochim & Donnelly, 2006).

Finally, psychobiographical study is exploratory-descriptive and descriptive-dialogic in nature (Yin, 2009). Exploratory research aims to discover ideas and insights, and the goal of descriptive research is to describe the subject or population concerning relevant variables, hence the exploratory-descriptive conception. The descriptive dialogic approach involves developing a dialogue between the exploratory-descriptive findings and theoretical conceptualisations (Edwards, 1998; Schwandt, 2001).

To recapitulate, psychobiographical study aims to discover and interpret a single, extraordinary, and complete life, psychologically. It falls within a qualitative, single-case design, which utilises a theoretical or interpretive framework. Psychobiography utilises both inductive and deductive approaches, which are exploratory-descriptive, descriptive-dialogic and morphogenic by nature (Elms, 1994; Fouché & Van Niekerk, 2010; Howe, 1997; McAdams, 1988, 1996, 2009; Runyan, 1983; Schultz, 2005; Simonton, 1999). Not only is psychobiography a fast-developing research method and genre, the lived experiences of individuals are fascinating and instructive (Jacobs, 2004; Rollyson, 2008). The study of historically significant individuals can inspire us or perhaps offer a context for re-examining our lived experiences, fortunes, and existing possibilities. Not only does psychobiographical research provide a method and structure for representing and understanding extraordinary people's lives in a unique and holistic way, but

also produces inspiration, insight, and knowledge that one could test against larger groups of populace, devoid of tests or experiments (Carlson, 1988; Elms, 1994; Munter, 1975; Runyan, 1984; Schultz, 2005; Vorster, 2003).

### **2.3 A Brief History and Timeline of Psychobiographical Development**

The history of psychobiography begins with Sadger, who wrote pathographies of distinguished writers in the early 1900s (Schultz, 2005). However, Sigmund Freud's (1910) analysis of Leonardo da Vinci (*Leonardo da Vinci and a memory of his childhood*) is considered the first modern psychobiography. The emergence of psychoanalysis at the beginning of the 20th century offered social scientists the opportunity to explain how childhood desires and frustrations inform the strivings of adult life (Runyan, 1982b). Despite the criticism psychobiographies attracted (i.e., being considered as applied psychoanalysis with a pathographic focus), psychobiographical studies increased throughout the 1920s and 1930s.

The 1940s produced relatively few psychobiographies, although Ponterotto (2014) noted that by the 1950s, the theories and methods undergirding psychobiography had expanded. Psychobiography was gaining recognition, and various professionals contributed works from different perspectives, using different methods of analysis. This recognition resulted in psychobiographical research expanding beyond the psychoanalytical perspective. Moreover, the prominence of personology and the consequent popularity of studying the lives of writers, artists, musicians, politicians, religious leaders, scientists and others, gradually led to improved works (Fouché, 1999; McAdams, 1988; Runyan, 1988a). Together with the development of personology, psychobiographies from renowned academics at Harvard University (e.g. Allport, 1965; Erikson, 1958, 1969; Murray, 1949), illustrate how psychobiography has matured over time. They also provide features for what is currently deemed a good psychobiography (McAdams, 1988, 2001).

Since 1950, interest and output in psychobiography have grown considerably. Moreover, an increasing number of social science researchers have employed this method (Kőváry, 2011; Ponterotto, 2014; Schultz, 2005). There has been increased acknowledgement of the value of biographical and autobiographical approaches to psychology over the past three decades. Fouché and Van Niekerk (2010) noted that Irving Alexander, Alan Elms, William Todd Schultz, and William McKinley Runyan made significant contributions to the field of psychobiography (see Table 2). After Elms published guidelines for writing psychobiographies, Fancher (2006)



held that psychobiography no longer seemed like a “dirty word after all” (p. 287). In 2011, Kőváry analysed trends in the discipline of psychology, and concluded that psychology finds itself in the middle of “a renaissance of psychobiography” (p. 739). Barenbaum and Winter (2013) supported Kőváry’s claim, when they indicated a current revival in the study of individual lives in their recent historical review of personality psychology.

The majority of psychobiographical studies were, and are still, psychodynamically grounded (Ponterotto, 2014; Schultz, 2005). However, lifespan developmental theories from Levinson, Erikson, Maslow, Digman, and Jung, are also extensively used. More recently, Perry (2012) used Adler’s theory of Individual Psychology (Adler, 1929). Also, Burnell (2013) applied Witmer and Sweeney’s (1992) Wellness model and Fowler’s (1981) Faith Development Theory. When considering subject choice in South Africa, Burgers (1939, 1960) completed the first two psychobiographies, respectively, on author Cornelis Jacobus Langenhoven and poet Louis Leipoldt. From 1961 until 1999, only three psychobiographical studies were completed. These studies were on Ingrid Jonker (Van der Merwe, 1978), Gerard Sekoto (Manganyi, 1996), and General Jan Smuts (Fouché, 1999).

Trends of psychobiographical studies conducted in South Africa between 1995 and 2004 indicated that white male subjects in the fields of politics, sport, art, religion, and medicine received the most attention. Black and female subjects received limited attention, and there were no studies conducted on coloured and Asian subjects (Fouché, Smit, Watson, & Van Niekerk, 2007). In 2010, Fouché and Van Niekerk revised the trends from 2005 to 2009 and concluded that there appeared to be an improved interest and enthusiasm in psychobiographical study. Psychobiography has also advanced into an established research field, with academic interest increasing in South Africa (Fouché & Van Niekerk, 2010). In 2014, Ponterotto maintained that the mounting body of psychobiographical studies presented at South African universities was proof of how extensively psychobiographical research had developed. Researchers associated with Rhodes University (Grahamstown), Nelson Mandela Metropolitan University (Port Elizabeth), the University of the Free State (Bloemfontein), and the University of Johannesburg, have conducted the most psychobiographical research (Fouché et al., 2007; Fouché & Van Niekerk, 2010). Table 1 lists some of the psychobiographies presented at South African universities.

Finally, the most striking tendency seems to be a shift from individual cases to comparative explorations. The accumulation of research findings could establish a database that

Table 1

*Psychobiographies Presented at South African Universities*

<b>Subject</b>	<b>Researcher</b>	<b>Year</b>
Cornelis Jacobus Langenhoven	Burgers, M.P.O.	1939
Louis Leipoldt	Burgers, M.P.O.	1960
Ingrid Jonker	Van der Merwe, L.M.	1978
Gerard Sekoto	Manganyi, C.	1996
Jan Christiaan Smuts	Fouché, J.P.	1999
Helen Martins	Bareira, L.	2001
Bantu Stephen Biko	Kotton, D.	2002
Balthazar John Vorster	Vorster, M.S.	2003
Albert Schweitzer	Edwards, M.J.	2004
Mother Teresa	Stroud, L.	2004
Wessel Johannes (Hansie) Cronje	Warmenhoven, A.	2004
Cornelis Jacobus Langenhoven	Jacobs, A.	2004
Hendrik Verwoerd	Claasen, M.	2006
Karen Horney	Green, S.	2006
Christiaan Barnard	Van Niekerk, R.	2007
Ray Charles	Biggs, I.	2007
Herman Mashaba	McWalter, M.A.	2008
Melanie Klein	Espinosa, M.	2008
Emily Hobhouse	Welman, C.	2009
Helen Keller	Van Genechten, D.	2009
Isie Smuts	Smuts, C.	2009
Jeffrey Dahmer	Chéze, E.	2009
Mahatma Gandhi	Pillay, K.	2009
Alan Paton	Greeff, M.	2010
Bram Fischer	Swart, D.K.	2010
Christiaan de Wet	Henning, R.	2010
Ernesto "Che" Guevara	Kolesky, C.	2010
Frans Martin Claerhout	Roets, M.	2010
Ralph John Rabie	Uys, H.M.G.	2010
Vincent van Gogh	Muller, H.	2010
Brenda Fassie	Gogo, O.	2011
Desmond Tutu	Eliastram, L.M.	2011
Paul Jackson Pollock	Muller, T.	2011
Winston Churchill	Moolman, B.A.	2012
Olive Schreiner	Perry, M.J.	2012
Friedrich Nietzsche	Booyesen, B.B.	2012
John Wayne Gacy	Pieterse, J.	2012
Josephine Baker	Eckley, S.	2012
Francis Bacon	Kerr, N.	2013
Beyers Naudé	Burnell, B.	2013

Note. Adapted from Fouché and Van Niekerk (2010), Perry (2012) and Burnell (2013).

will aid the comparative analysis of biographic categories (Elms, 2007; Ponterotto, 2014). Elms noted that there is no reason to protect psychobiography's "methodological purity by refusing to look also at data across a number of those individual and unique writers" (2007, p. 111). Fouché and Van Niekerk (2010) also noted that it was also important to continue encouragement and improvement of psychobiographical research, not only in South Africa, but also across Africa. Table 2 provides a timeline, demonstrating the evolution of psychobiography since the 1900s until 2014. It delineates some of the most significant events and/or criticisms that influenced the advances made, as well as pioneering works published during that time.

## **2.4 The Value of Psychobiography**

Several researchers have emphasised valuable features of psychobiography (Carlson, 1988; Elms, 1994; Fouché & Van Niekerk, 2010; Howe, 1997; McAdams, 2005; Roberts, 2002). A short discussion on each of the most prominent benefits of psychobiography follows.

The first value of psychobiographical study is its contribution to an understanding of individual uniqueness. Psychobiographers select individuals based on their extraordinariness, exceptional abilities, and often even their obscurity in society (Howe, 1997; McAdams, 2005). Schultz (2005) noted that few would dispute the value of a comprehensive study and life review of significant people in social history. Through the study of lives, researchers gather information about the diversity in human personality and encourage the development and possible adaptability of a person (Howe, 1997; Ponterotto & Reynolds, 2013). The morphogenic nature of psychobiographical research highlights the individual as a whole (Carlson, 1988; Runyan, 1988b). Psychobiographical research therefore provides a holistic description of the individual under study, offering an in-depth understanding of his or her uniqueness (Elms, 1994).

The second value of psychobiographical study is the recognition of the influence of social, historical, and cultural context on the individual. In his work, Erikson explained how the socio-historical context has an ineradicable influence on individuals (1950, 1968).

Psychobiography acknowledges the interactive and vital relationship between individuals, their perceptions, experiences, and the social historical contexts in which they live. Because the aim of psychobiography is to gain a holistic understanding of the person under study, it pays attention to the larger context. This context includes the historical and cultural experiences, as well as the family history and socialisation of the individual. It is necessary for

researchers to recognise the influence of social, historical, and cultural contexts to improve our understanding of our social world (Neuman, 2006; Roberts, 2002).

Table 2

*Psychobiographical Development Over Time*

Period	Trend
1900	<ul style="list-style-type: none"> <li>Sadger wrote the earliest known psychobiographies (i.e. pathographies) in 1908 and 1909.</li> </ul>
1910	<ul style="list-style-type: none"> <li>Emergence of psychoanalysis leads to first modern psychobiography by Freud on <i>Leonardo da Vinci and a Memory of His Childhood</i>.</li> <li><b>Critique:</b> Pathographic focus demonstrated in the study of Florence Nightingale, by Strachey.</li> <li><b>Notable works:</b> Shakespeare, Giovanni Segantini, Amenhotep IV, Martin Luther, and Socrates.</li> </ul>
1920	<ul style="list-style-type: none"> <li><b>Critique:</b> Works published by individuals devoid of formal training in psychoanalysis or psychology.</li> <li><b>Notable works:</b> Edgar Allan Poe, Margaret Fuller, and Abraham Lincoln.</li> </ul>
1930	<ul style="list-style-type: none"> <li>The field experiences a deluge of psychobiographies.</li> <li><b>Critique:</b> Psychobiographies are reductionistic.</li> <li><b>Notable works:</b> Tolstoy, Sand, Goethe, Nietzsche, Poe, Rousseau, Darwin, and Alexander the Great.</li> <li><b>South Africa:</b> Burgers wrote the first psychological analysis of an extraordinary South African individual, Cornelis Jacobus Langenhoven.</li> </ul>
1940	<ul style="list-style-type: none"> <li>Psychobiographies are less prominent but characterised by improved research.</li> <li><b>Notable works:</b> George III and <i>The Mind of Adolf Hitler</i> (written in the 1940s but only published in 1972).</li> </ul>
1950	<ul style="list-style-type: none"> <li>Increase in analyses of writers, artists, musicians, politicians, religious leaders, and scientists.</li> <li>Personology prominence leads writings of Harvard University academics Allport, Erikson &amp; Murray.</li> <li>Erikson illustrates that socio-historical context is inseparable from the individual.</li> <li><b>Notable works:</b> <i>Young Man Luther</i> by Erikson, <i>Melville, H. Pierre, or the Ambiguities</i> by Murray, and <i>Letters from Jenny</i> by Allport.</li> </ul>
1960	<ul style="list-style-type: none"> <li>Erikson places importance on transferences &amp; countertransferences in his work on Gandhi.</li> <li><b>South Africa:</b> Burgers present a study of the poet Louis Leipoldt.</li> </ul>
1970	<ul style="list-style-type: none"> <li>Psychobiography reverted to personality psychology in striving to be more scientific.</li> <li><b>South Africa:</b> Van der Merwe examined the life of Ingrid Jonker.</li> </ul>
1980	<ul style="list-style-type: none"> <li>Psychology experiences a narrative turn.</li> </ul>
1990	<ul style="list-style-type: none"> <li><b>Pioneering works:</b> <i>Personology: Method and Content in Personality Assessment and Psychobiography</i> by Irving Alexander (1990) and, <i>Uncovering Lives: The Uneasy Alliance of Biography and Psychology</i> by Alan Elms (1994).</li> <li><b>South Africa:</b> Chabani Manganyi publishes a biography of Gerard Sekoto in 1996, and Fouché publishes a psychobiographical study of the life of General Jan Christiaan Smuts in 1999.</li> </ul>
2000	<ul style="list-style-type: none"> <li>Shift from a single case to comparative explorations.</li> <li>Research indicated most used lifespan developmental theories include those of Levinson, Erikson, Maslow, Digman, and Jung.</li> <li><b>Pioneering works:</b> <i>Handbook of Psychobiography</i> by William Todd Schultz, with chapter contributions by Dan McAdams, Alan Elms, William Runyan, and Irving Alexander.</li> <li><b>South Africa:</b> Psychobiography becomes popular with postgraduate research options in psychobiography offered by some South African universities, leading to a surge in postgraduate theses.</li> </ul>
2010	<ul style="list-style-type: none"> <li>Accumulation of idiographic research results expands database for comparative analysis.</li> </ul>

Note. Based on Alexander, 1988, 1990; Allport, 1965; Carlson, 1971; Elms, 1994, 2007; Erikson, 1958, 1969; Eysenck, 1991; Freud, 1910; Fouché, 1999; Fouché et al., 2007; Fouché & Van Niekerk, 2010; Kőváry, 2011; McAdams, 1988, 2001; Perry, 2012; Runyan, 1988a; Schultz, 2005.

The third value of psychobiographical study is the integration of process and pattern over time. Psychobiography aims to understand the life of a person as it unfolds over time. Therefore, it concentrates on (preferably) finished lives, which allow the researcher to trace patterns of human development over an entire lifespan. This method allows the exploration and

recording of different developmental processes and functioning of the individual, at any time, and in any one or multiple situations. Correspondingly, it provides the researcher with an opportunity to clarify previously misunderstood and overlooked connections (Elms, 1994; Runyan, 1983; Schultz, 2005).

A fourth value of psychobiographical study is the acknowledgement and incorporation of the individual's subjective reality. Carlson (1971) noted that personality cannot be investigated experimentally, and that to know a person, interpretation is required and not the manipulation of variables. The development of narrative analysis and the increased influence of postmodernism have revived the importance of personal meaning and choice. It has led to the inclusion of a narrative and time dimension to psychobiographical study (Roberts, 2002). In biographical research, and psychobiography by extension, individuals are seen as the creators of meaning in their everyday lives. Individuals then act according to these assigned meanings to make sense of their social existence (Stanley, 1992). The development of biographical writing, that is, published interviews, autobiographies, and biographies, enables researchers to enter the subjective world of individuals. Psychobiography's value lies therein that it allows researchers to explore an individual's subjective reality, that is, how contextual interactions and other variables influence an individual's perceptions (Runyan, 1983; Yin, 1994).

Finally, psychobiographical study aids theory testing and development. Several researchers have emphasised the potential contribution of psychobiographical data to the development and improvement of theory, especially developmental and personality theories (Alexander, 1988; Carlson, 1988; Stake, 2005). Moreover, Fouché and Van Niekerk (2010) added that psychobiographical studies are "ideally equipped to investigate and extend theoretical constructs and theory captured by sub-disciplines such as personality, career, health, developmental and positive psychology" (p. 501). Lately, psychological theories have merged with biographical traditions in other disciplines. For instance, history, political science, and American studies, have also published psychobiographies, which serve as models for current research. Psychobiographical training also gives students grounding in the history and traditional theories of psychology. It promotes the development of research skills and highlights socio-historical context in understanding different life stories (Anderson, 1981; Elms, 1994; Ponterotto, 2014; Runyan, 1982a). Theory testing and development could aid the development of educational and psychological interventions. These interventions could improve human development and enhance the quality of life. They contribute to the development of recognition

of others, but also recognition of the self through necessary self-reflection (Kőváry, 2011; Ponterotto, 2014; Schultz, 2005).

To summarise, psychobiography's value lies in understanding a person's uniqueness through studying extraordinary individuals. It recognises the influence of social, historical, and cultural contexts, on a person's psychological development. Psychobiography follows the process and pattern of an individual over time, as well as aiming to know and understand the subjective reality of personal experiences. Ultimately, it provides a holistic description of the person under study. Finally, psychobiography plays a role in theory testing and development, which not only supports research-skills development, but also encourages and informs the development of educational and psychological interventions to enhance the quality of life.

## **2.5 Criticisms of Psychobiography**

Psychobiography has faced criticism from the very beginning. Some of the longstanding criticisms include the selective withdrawal of data, over-determinism, and an inclination to pathologise subjects (Barzun & Graff, 1977; Elms, 1994). In 2014, Ponterotto noted that a significant amount of psychobiographical writing (e.g., Anderson, 1981; Chiles, 1990; Elms, 1994; Runyan, 1982a; Schultz, 2005) had addressed criticisms on existing psychobiographies. These criticisms included explicit subjectivity, analysing the absent subject, cross-cultural and theoretical differences, reductionism, and psychobiography being an easy genre. To combat these criticisms and to aid the continuous development of psychobiographical research as a field, psychologists have examined both exemplary and flawed psychobiographical research practices. Subsequently, they produced recommendations on methodological and ethical guidelines (Ponterotto, 2014). The above-mentioned criticisms, as well as the recommendations for conducting psychobiographical research, are discussed in more detail in Chapter 4.

## **2.6 Chapter Summary**

This chapter provided a description of psychobiographical research and main features. It also presented a contextual foundation for psychobiographical research, by providing a brief history and timeline of its development over the past century. The chapter concludes by considering some of the positive elements of psychobiographical research, as well as criticism of the genre.

## CHAPTER 3

### ERIKSON'S THEORY OF PSYCHOSOCIAL DEVELOPMENT

#### 3.1 Chapter Preview

This chapter focus on the psychosocial development across the human lifetime as proposed by Erik Erikson. It briefly describes the foundation of Erikson's theory as well as its central features. A description of each of the eight stages of psychosocial development follows. These descriptions will attempt to familiarise the reader with the particular pivotal points of each stage, as well as the possible outcomes. Finally, the chapter concludes with criticism of and accolades for Erikson's theory of psychosocial development.

#### 3.2 Foundation and Features of Erikson's Theory

Erik Erikson (1902–1994) worked with Sigmund Freud in Vienna, Austria, where he studied as a psychoanalyst. Erikson held very strong psychoanalytic ideas, much in line with Freud's concepts; however later in his career his thinking diverged from what he viewed as "implicit fatalism" (Erikson, 1987, p. 598). Erikson thought that Freud's thinking failed to ask questions about what contributes to healthy development. To address this problem, Erikson adopted a lifespan approach to personality development. He placed importance on an individual's life after childhood, which contrasted with Freud's belief that personality was shaped, and reasonably fixed, by the age of five (Erikson, 1950, 1968; Hoare, 2005). Erikson (1977b) showed his departure from Freud with a chapter in his book titled, *Toys and reasons: Stages in the ritualization of experience*. Hoare (2005) noted that the title's wording was "meant to show that one must study and understand normal, healthy, and whole humans, and their incorporation into society, as the focus for all else, mental illness included" (p. 21). Erikson asserted that mental health requires an individual to function actively as an "adaptive" being, and to whatever possible extent, that environmental conditions should conform to human needs (1978, p. 45).

Erikson's (1959) theory of psychosocial development describes individual development as a succession of "bipolar" stages that occur across the lifespan (Sneed et al., 2006, p. 149). Thus, each stage is characterised by its own conflict or crisis and two possible outcomes (Erikson, 1950, 1968). Psychosocial crises characterise these stages as they reach dominance based on changes in biological, psychological, and social processes. Although Erikson placed

these crises at particular points across the individual's lifespan, he left some leeway for individuality and unpredictability in the timing of these issues. Erikson (1963) noted that the eight crises could possibly arise at any time in the individual's life, by way of specific psychosocial forces, or in his words, the "hazards of existence" (Erikson, 1963, p. 274). Later stages could be predominant earlier in life and earlier stages visited again in later life; as a result, all possible psychosocial crises could possibly appear at all ages. Each stage has a general progression describing the average person's development through the different stages; however, the interaction between the individual and the environment could augment individual differences, in these developmental progressions (Sneed et al., 2006). Therefore, later nurturance and support, or breakdown and rejection, could change any course of events (Hoare, 2005).

There are certain features central to Erikson's theory. These include: (a) epigenesis, (b) social and cultural factors, (c) psychosocial crises, (d) ego identity, and (e) psychosocial strength or virtue. A brief description of each of these features follows.

Erikson believed that hereditary factors influence development through the manifestation of characteristics, according to a genetically determined blueprint. Erikson (1968) postulated in his written work that "anything that grows has a ground plan, and that out of this ground plan parts arise, each part having its time of special ascendancy, until all parts have arisen to form a fractioning whole" (p. 92). To describe this process, Erikson borrowed a term from embryology, namely epigenesis (Erikson, 1950, 1959, 1968; Sadock, Kaplan & Sadock, 2007). The epigenetic principle holds that an individual's characteristics emerge at certain ages, in a particular, genetically determined sequence, in such a way that an individual constantly develops as a whole, in both observable and unnoticeable ways (Erikson, 1950; Meyer, Moore & Viljoen, 2008; Roazen, 1976). More concisely, Erikson (1968) held that humans follow innate laws of development "which create a succession of potentialities for significant interaction by those who tend [them]" (p. 52.)

Drawing on his work as anthropologist, teacher, child psychoanalyst, and biographer, Erikson emphasised the role that social, cultural, and historical factors play in personality formation across the lifespan. He stressed that the stages happen in the same sequence across cultures; however how individuals resolve these conflicts varies between cultures (Bukatko & Daehler, 2003; Erikson, 1950, 1968; Sadock et al., 2007). Bronfenbrenner (1979) noted that this expansive context corresponds with developmental psychologists' interest in the ecological



approach to person-in-environment, placing emphasis on the relations between individuals at different systems levels.

Each stage links a significant social life-challenge or crisis to an important part of psychological development, which Erikson referred to as an identity crisis (Erikson, 1950, 1968). Each crisis within a developmental stage has a particular time, a decisive period, in which maturation takes place (Bukatko & Daehler, 2003; Erikson, 1968). A crisis does not indicate a risk or catastrophe, but rather a decisive moment of increased susceptibility and heightened potential. This is a point in time when things may either go well, or poorly, contingent on the individual's experiences in previous stages and current life circumstances (Hamachek, 1990). Consequently, it is the ontogenetic resource of generational strength and adjustment that needs to be resolved before an individual is ready to continue to the next stage (Erikson, 1950; Sadock et al., 2007).

There are two possible outcomes for each developmental crisis. The triumph over a crisis in an earlier stage lays the foundation for later stages, or failure to resolve a crisis leads to regression (Bukatko & Daehler, 2003; Erikson, 1950, 1978). During regression, an individual spends time and energy resolving earlier crises, which will be visible in physical, social, cognitive, and emotional maladjustment. For example, an adult who is experiencing difficulty in developing intimacy in Stage 6 may have unresolved identity issues associated with Stage 5. Erikson expressed, "each stage adds something specific to all later stages, and makes a new ensemble out of all the earlier ones" (quoted in Evans, 1967, p. 41). However, an individual's development through all stages exhibits a tendency to overcome, rather than fail, his/her particular developmental challenges (Erikson, 1963; Sadock et al., 2007).

Erikson stated that some indicators of the successful resolution of the stages are observable in an individual's high level of ease with him or herself, a sense of direction in life, a feeling of stable identity, and confidence that the self will be validated by significant others (Erikson, 1968, 1979). This resolution is associated with ego identity, which he described as the conscious sense of self that people develop through social interaction (Erikson, 1950, 1968). For Erikson, identity denoted an understanding and acceptance of oneself and one's society, therefore, finding an answer to "Who am I?" in each succeeding psychosocial developmental stage (Bjorklund & Hernández Blasi, 2012, p. 57). An individual's ego identity is constantly changing according to new experiences and information acquired in daily interactions with others. Therefore, the ego refers to the part of the self that is in touch with the outside world.

Individuals use mental processes such as perceiving, thinking, reasoning, remembering, and attending in different ways to reach their goals and express their self-concepts. Ego strength is thus a reflection of the extent to which individuals are more or less successful in accomplishing this (Hamachek, 1990).

Through the successful resolution of each stage, an individual obtains a psychosocial strength or virtue, which contributes to identity formation (Erikson, 1950, 1968; Hook, 2002). Virtues are the same as life skills or qualities, which prompt an individual to move persistently through the successive stages of life. Erikson (1968) noted that an individual's readiness to "be driven forward, to be aware of, and to interact with a widening radius of significant individuals and institutions" has an impact on the development of the unfolding personality (p. 93).

### **3.3 The Eight Psychosocial Stages of Development across the Human Lifespan**

Erikson (1950) conceptualised the human life cycle in eight distinct stages, originally known as the eight ages of man, as a means of describing and explaining ego development and identity (Slater, 2003). Table 3 provides a summary of the eight stages and relevant features of each developmental stage.

#### **3.3.1 Stage 1: Basic Trust versus Mistrust**

This fundamental stage takes place from birth until around eighteen months. Erikson described this stage as the "cornerstone of the healthy personality", in which the essential task of infancy is the development of basic trust in others (Erikson, 1959, p. 56; 1963). He believed that during the early months and years of life, infants learn whether the world is a good and secure place in which to live, or a source of pain, sadness, frustration, and uncertainty. Since infants are completely dependent and unable to survive on their own, the first emotional task is to learn to trust the primary caregiver. If infants' basic needs are met, they are thought to develop 'basic trust' in the world and thus to evolve a basis of self-trust, which is fundamental for later development (Iwaniec, 2006).

Morris, Maisto and Levine (2002) noted that infants waver between trusting and not trusting their primary care givers during this early phase. If caregivers are responsive to infants' needs in a predictable and thoughtful way, infants develop a sense of trust, and they are able to hope and have faith that things will be bearable (Erikson, 1950, 1959; Hersen & Thomas, 2006). Therefore, virtue resulting from a successful resolution of this crisis was termed hope (Erikson,

1965). Infants now also learn the social modality to receive, therefore, to take what the caregiver presents, and receive what they, the infants, need. This pertains to the accepting of food, warmth,

Table 3

*Erikson's Eight Stages of Psychosocial Development*

Erikson's Eight Stages of Psychosocial Development					
Stage	Psychosocial crisis	Age (Yrs.)	Significant relations	Ego strengths/virtues	Pathology
1	Basic trust vs. mistrust	Birth–18 months	Mother	Hope	Mistrust
2	Autonomy vs. shame/doubt	18 months –3	Parents	Will	Shame / Self-doubt
3	Initiative vs. guilt	3–5	Family	Purpose	Guilt
4	Industry vs. inferiority	5–13	Community	Competence	Inadequacy / inferiority
5	Identity vs. confusion	13–21	Peers	Fidelity	Role confusion / isolation
6	Intimacy vs. isolation	21–40	Partners/friends	Love	Isolation
7	Generativity vs. stagnation	40–60	Household/workmates	Care	Rejectivity / stagnation
8	Integrity vs. despair	60–death	Humankind	Wisdom	Despair

Note. Adapted from Erikson, 1959; Markstrom & Kalmanir, 2001; Newman & Newman, 2003.

love, and safety (Erikson, 1950, 1968; Sadock et al., 2007). The quality of the relationship with the main caregiver, as opposed to the extent of frustration or deprivation, is critical at this stage, as it influences the extent to which infants learn to trust their environment. Erikson (1965) noted that children do not become neurotic from the “frustrations”, but rather from the absence or loss of societal meaning in frustrations (p. 241).

Infants that are subjected to unpredictable or callous care learn that the world is threatening; they learn mistrust and tend to withdraw to protect themselves (Erikson, 1963; Hersen & Thomas, 2006; Sadock et al., 2007). Iwaniec (2006) noted, “Seriously emotionally neglected and abused infants are observed to be withdrawn, lethargic, apathetic, and, in the most adverse circumstances, depressed” (p. 117). Mistrust might also be the result of defensive splitting, which describes the process of separating the inner from the outer self (Welchman, 2000). This usually accompanies distortions of reality, projections, and introjections. Substantiating Erikson’s (1950) theory, Young, Klosko and Weishaar (2003) argued that unsuccessful psychosocial task resolution leads to maladaptive schemas (cited in Thimm, 2013). However, infants need to experience both trust and mistrust, since there needs to be a balance between the two for healthy development (Hook, 2002). Sowers and Dulmus (2008) noted that

this stage is responsible for the formation of “an enduring lifelong pattern” as “these important initial adaptive qualities may filter a person’s perceptions over a lifetime unless other critical events affecting this general orientation occur” (p. 238).

### **3.3.2 Stage 2: Autonomy versus Shame and Doubt**

From 18 months to around three years, children are trying to make sense of the environment and to control it, striving for mastery and control. Pre-school children’s cognitive, emotional, and intellectual development needs sensitive and reassuring conditions to encourage their abilities. Children now also become aware of their separateness from the main caregiver and endeavour to establish a sense of personal agency and autonomy. For Erikson (1965), autonomy refers to self-reliance, or a sense of being independent. In essence, autonomy refers to the ability to think for oneself and having the confidence to act accordingly.

Children become increasingly aware of their bodies and the ability to control them, as seen in activities such as eating, dressing, toileting and moving around (Hook, 2002). Their physical development allows increasing autonomy and more contact with the environment, which includes the ability to start to speak. This leads them to practise the social modalities of holding on and letting go, and experience the first stirrings of the virtue will (Erikson, 1963; Hersen & Thomas, 2006). Development in this stage pivots on the amount and method of control implemented by the parents. Where the ratio of parental control is constructive, children develop an appropriate sense of autonomy and the capacity to have and to hold. The successful resolution of this stage therefore involves a developing ability to control oneself, and to learn to decide for oneself, either to retain or to expel. Erikson (1963) stated, “From a sense of self-control without loss of self-esteem comes a lasting sense of goodwill and pride” (p. 254). Therefore, parents should allow children to continue experimenting with autonomy, as it aids their building a strong foundation of self-confidence and taking pleasure in independent behaviour.

On the contrary, constant discouragement and/or criticism by parents instil an overwhelming sense of shame and self-doubt in children. These children lack confidence in their abilities to perform, and they assume that they will fail at whatever they do. They also abstain from all kinds of new activities in order to avoid reproach. Learning new skills becomes slow and painful for the child. Feelings of self-confidence, a sense of achievement and self-worth are replaced by constant doubting and subsequent developmental delays (Iwaniec, 2006). Therefore,

where parental control is destructive, doubt and shame will undermine free will (Sadock et al., 2007). Thimm (2010) added that a scheme of impaired autonomy and performance leads children to perceive a lack of ability to function autonomously and execute tasks successfully. When considering the development of personality problems or disorders, scholars have made several propositions. One is, if a person is stuck at the transition between the developmental phases of hope and autonomous will, paranoid fears of persecution may develop. Hook (2002) noted that intolerance and irrational fear could be due to the person's lack of confidence. Such fears could also result in suicidal tendencies or antisocial personality disorders. Then again, obsessive-compulsive personality disorder, noticeable in inflexible and perfectionistic traits, might come from the conflicting tendencies between holding on and letting go. The ritualised behaviour may be a result of doubt overcoming autonomy, leading to the development of a punitive conscience (Sadock et al., 2007). Erikson attributed this to parents who overly promote dependency in their children, therefore hindering their children's ability to deal with the world in an autonomous way. He noted that these children tend to over-manipulate themselves, and become too self-conscious, which therefore may result in obsessiveness, stubbornness, and obsessive-compulsive behaviour (Erikson, 1963).

### **3.3.3 Stage 3: Initiative versus Guilt**

From around the age of three years to five years, children extend their attention to the physical and social world (Erikson, 1950, 1968; Sadock et al., 2007). Children engage in playful exploration and actively investigate their environment, using their imagination to experiment and explore. Children now also learn what is acceptable and what is not from their parents. The oedipal stage becomes notable during this time, in which children identify with the parent of the same sex and form a jealous attachment to the parent of the opposite sex. This is visible in children's ritualised play, where they assume gender roles and an imaginary future (Erikson, 1963; Welchman, 2000). The parent's role stays important, as they guide and discipline their children, but also encourage curiosity and imagination (Craig & Baucum, 2002).

When parents recognise their children's curiosity, and establish clear limits for experimentation, children assume responsibility for themselves, and occasionally for their siblings, which leads to the development of a sense of purpose (Erikson, 1978). The virtue of purpose is the result of a positive established balance between initiative and guilt. A positive response to challenges, taking responsibility, mastering new skills, and interacting with peers

effectively, leads to the development of initiative (Meyer et al., 2008). For children to develop a positive view of themselves, parents need to allow their children to explore and act on their newfound initiative (Sadock et al., 2007). The superego limits what is permitted, but also nurtures positive goals, consequently setting the direction in which childhood dreams might be linked to adulthood goals (Erikson, 1978). This is the stage where the process of discovering what kind of person the child is going to be begins (Erikson, 1959; Hergenhahn & Olson, 2003).

When parents have difficulty empathising with their children's need for curiosity and overly restrict experimentation, children might develop guilt over the drive for conquest, and anxiety over the anticipated punishment (Corey, 2005; Sadock et al., 2007). This may lead to the child's feeling unworthy and fearful, and ultimately lacking in self-confidence (Erikson, 1968). Ruthlessness is such a maladaptive tendency, seen with individuals who frequently plan success at the expense of others. Psychopathy is the extreme of this malignant tendency, in which the individual tries to inhibit spontaneous action in order to avoid guilt (Erikson, Erikson & Kivnick, 1986). Other adult problems that may stem from this developmental stage include inhibition or denial, or, alternatively, recklessness, showing-off, and risk-taking behaviours, all in an effort to overcompensate for such inhibitions (Erikson, 1963).

The successful resolution of this stage is therefore learning a sense of purpose, a balance between taking initiative and respecting boundaries. Boeree (2006) described it as having the courage to act while understanding one's own boundaries, and being cognisant of previous failures. For Erikson (1963), the social institution correlating with this stage is economic endeavour, which originates from the role models that children assume, and which they will continue to imitate while growing into active and productive citizens.

#### **3.3.4 Stage 4: Industry versus Inferiority**

This transitioning from middle childhood spans into adolescence, until around 13 years. Erikson (1963) noted that by now, at some unconscious level, children have realised that there is no practical or feasible future within the closed circle of the family and that it is necessary to spread their abilities and initiatives across a wider social realm. Children become preoccupied with the goal of gaining competence and mastering tasks. Morris et al. (2002) noted that children continually develop their competencies of social interaction, establishing friendships, schooling, taking on responsibility, being productive, and learning to be self-reliant. It becomes

increasingly important for children to develop the ability to communicate and engage with peers and to receive positive acknowledgement from them (Hook, 2002).

If children are unable to develop the ability to set and reach personal goals, particularly in relation to peers, a sense of inadequacy and inferiority develops (Corey, 2005; Erikson, 1963; Hook, 2002). Children who fail are ridiculed or humiliated, develop a sense of inferiority, and in adulthood often lack the motivation to achieve (Schunk, 1985). Inferiority complexes, feelings of worthlessness, incompetence, and low self-esteem are rooted in this stage of development (Erikson, 1963). Iwaniec (2006, p. 122) supported Erikson's views. She noted, "Low self-esteem demonstrates itself in uncertainty, constant doubting, a sense of guilt, a belief that everything which is unfortunate or problematic is their fault." Hergenhahn and Olson (2003) proposed that in later life, as adults, they might overrate their positions in the workplace. Life and work are equal to them, and they are therefore, blinded by the other facets of human existence. Another maladaptation of this stage is limited ability, which often occurs when children are pushed to specialise their talents at the expense of broader interests (Boeree, 2006). If children do not develop social skills, it may result in later life in avoidance of social interaction, or inertia. This distortion of apathy and lack of interest correlates with Adler's (1929) inferiority complex.

Successful resolution of this stage is the development of a sense of competence or industry, which stems from learning new skills and taking pride in things made (Erikson, 1978). When developing a sense of competency and self-efficacy, it is not only mastery of skills that plays a role, but also being rewarded or receiving acknowledgment from others. Erikson (1963) noted that the capacity to connect, communicate, and receive the positive acknowledgment from peers becomes highly valued. This intrinsic satisfaction feeds the drive for industry (Hersen & Thomas, 2006). This is evident in later life, where through devotion and attentiveness, the individual learns to appreciate and take pleasure in the successful completion of work.

### **3.3.5 Stage 5: Identity versus Role Confusion**

Erikson held that "in the social jungle of human existence there is no feeling of being alive without a sense of identity" (1968, p. 130). In adolescence, from around the age of 13 to 21 years, identity formation is central and relies on the individual's previous roles during childhood. For Erikson (1963), the main task during this stage is to achieve ego identity and avoid role confusion. A complex interplay of several systems, for example, family, cultural, economic, and

political, is involved in individual identity formation. The concept of ego identity looks at the relationship between individuals and their society, centring on how individuals develop the ability to master their environment. Erikson suggested that there is a “mutual complementation of ethos and ego, of group identity and ego identity” (Erikson, 1959, p. 23); he hereby implies that there is a link between the inner world of the person and his/her distinctive history and values. This stage signifies the transition from childhood into adulthood (Erikson, 1968).

In 1963, Erikson introduced the terms ‘psychosocial moratorium’ and ‘ideology’. Psychosocial moratorium refers to a period in which it is socially acceptable for adolescents to explore and experiment before settling on a more permanent identity. Ideology implies a world image that offers adolescents a sense of order and orientation (Erikson, 1963). Adolescents need to find a place in the world, and Erikson points out how important it is to recognise that the individual, together with society, creates identity (Erikson, 1959). This is visible in the requirement of finding a peer group with whom adolescents can associate to meet their need for belonging (Hersen & Thomas, 2006). Adolescents need sufficient time and social freedom to test different developing identities within a controlled and guiding environment. If insufficient time and structure are granted to integrate a main identity, ego diffusion (a severe form of role confusion) may occur, which is the inability to settle on a stable and well-founded sense of self (Corey, 2005; Maier, 1988). Ego diffusion may lead to social alienation, which is a sociological concept that denotes “a low degree of integration or common values and a high degree of distance or isolation between individual, or between an individual and a group of people in a community or work environment” (Ankony & Kelley, 1999, p. 121). According to Hook (2002), unsuccessful resolution of this stage is often related to substance abuse and antisocial personalities. Erikson (1950, 1980) views this as deviancy and extreme non-conformity, which proposes negative identity formation, or accepting an identity in opposition to the one society suggests. Individuals may rather join groups that provide a negative sense of self, as being ‘bad’ or ‘nobody’ is easier to tolerate than not knowing oneself (Boeree, 2006).

Ego identity centres on experiencing self-consistency and being at ease with oneself and one’s social roles (Erikson, 1963). The tension lies in finding a balance between holding together this range of potential identifications and trying to incorporate an identity (Hook, 2002). As adolescents move towards the successful resolution of this stage, they begin to take part in society while preserving individuality and independence. When individuals have successfully resolved this stage, they develop an integrated self-image and a sense of reliability. Therefore,



fidelity is the virtue that develops from the successful resolution of this stage (Erikson, 1963, 1978).

### **3.3.6 Stage 6: Intimacy versus Isolation**

From 21 to 40 years of age, the main psychosocial crisis for adults is being able to share oneself with another, in both intimate and social relationships, without losing one's own identity (Erikson, 1963, 1978; Hersen & Thomas, 2006). Intimacy is the ability to commit even when it demands significant compromises or sacrifices (Erikson, 1965). Successful navigation through this stage requires that individuals have developed a stable sense of their own identities. Therefore, this stage is dependent on the successful resolution of prior crises. If previous stages have not been successfully resolved, it is likely that they will reoccur during this stage (Hook, 2002). Just as the first stage laid a foundation for trust and connectedness on which autonomy and independence were developed, so does the previous stage form a basis for independence, on which a new level of connectedness and trust develop (Watson, Burrows & Player, 2002). The development of an ego-identity would provide the individual with a confident self-definition to risk vulnerability and mutuality with another, without fear of losing a sense of self (Erikson, 1968). The development of intimacy in this stage is only the start of the development of more complex kinds of connectedness. The goal is to maintain ego integrity without its becoming integrated into something or someone else.

Failure to commit to such relationships, thus the failure to develop intimacy, may lead to distancing or isolation (Corey, 2005; Hook, 2002). Erikson noted that apart from isolation, self-absorption might also occur. Self-absorption and isolation are the result of the inability to tolerate the fear of ego loss that arises from experiences of self-abandonment, for example, sexual orgasm, aggression, inspiration, passion, and instinct. Isolation may also extend into broader social relationships. This preference to isolate oneself, and if required, eliminate those forces and individuals whose essence seems dangerous to one's own, was termed by Erikson (1965) as distantiation.

Successful resolution of this stage is the ability to commit to relationships, and learn the virtue of love. Love is the capacity to be involved in an intimate relationship with a person of the opposite sex, with whom one shares commitment, procreation, and recreation (Erikson, 1978). A strong sense of self is required to allow oneself to become vulnerable to another person

and voluntarily place part of one's happiness and wellbeing in the hands of someone else.

Without a strong sense of self, one would not have the capacity to take this step.

Erikson adopted Freud's belief that healthy, functioning individuals should not only encompass the ability to love, but be able to *love and work*. This refers to being productive in one's work, but in such a way that it does not compromise being a loving person. Erikson held that, both at work and in private life, people learn with whom they would like to be (Erikson, 1978).

### **3.3.7 Stage 7: Generativity versus Stagnation**

From about 40 to 60 years of age, it is assumed that individuals have resolved most earlier life crises and are now open to direct their attention to the assistance of others (Corey, 2005; Erikson, 1950, 1968). The focus of this stage is what Erikson termed generativity. Erikson asserted that generativity is primarily a concern for founding and guiding the next generation, and denotes productivity and creativity (Erikson, 1968). Generative people do not only feel a commitment to their own children, but to humanity as well. They feel responsible for their own part of the world and see themselves as contributing members of society. Welchman (2000) noted that older generations care for the next and share knowledge, values and culture through socialisation. Therefore, successful navigation of this stage involves generative behaviour, where individuals pass on knowledge and skills while finding satisfaction in their authoritative roles and responsibilities in the community. Care is the virtue that develops at this psychosocial stage (Erikson, 1978). Erikson claimed that successful development during this stage is very difficult if individuals have not by now allowed themselves to be part of intimate relationships, since this new obligation requires that people, once again, willingly sacrifice some independence to be committed to others. In Erikson's opinion, to achieve this, both people's identities and sense of intimacy with others must be secure (Watson et al., 2002).

During this time, people begin to adjust to the incongruity between dreams and actual achievements. If individuals fail to realise a sense of productivity and generativity, this may lead to psychological stagnation (Erikson, 1963, 1978). For Erikson, selfish living and stagnation were entwined (Watson et al., 2002). Erikson noted that without this commitment and focus, people would mainly live for themselves and for their own pleasure without any regard for the next generation or the greater good. These people would stagnate in their development, not becoming more mature or more connected than they were in adolescence or young adulthood. A

variety of distractions, for instance, alcohol or other infidelities, may disguise stagnation. In addition, it may lead the person to experience mid-life crisis during this stage.

### **3.3.8 Stage 8: Integrity versus Despair**

From the age of 60 until death, mostly because of physical decline and the loss of financial power and responsibility, people are again amid a crisis of change. People now face the dilemma of achieving personal integrity, which is significantly influenced by their social circumstances. Erikson (1978) described personal integrity as “the acceptance of one's one and only life cycle, and of individuals who have become significant to it, as something that had to be and that, by necessity, permitted of no substitutions” (p. 139). Near the end of one's life, one must come to grips with the inevitability of death and knowing that one's options and chances for different life courses are essentially over. As such, this is the only life you have; there is no other. Thus, the two main tasks of this stage are to master and adjust to these changes in one's opportunities, and, to develop a final identity for oneself that includes what one is like in old age. Successful people will be able to integrate all aspects of their identities and will feel good about what life was (Watson et al., 2002). Erikson (1968) supposed that people who attained ego integrity and who did not fear death, would provide an even stronger sense of trust in life to those who were just starting out, thus completing the cycle. People would thus have a sense of accomplishment – that they are leaving something good behind for others. There is yet a third meaning of the term ‘integrity’. Erikson (1968) held that people could at last fully integrate the two opposing needs of life, to be independent of and connected to others. For successful resolution of this stage, individuals must have developed all the aforementioned ego qualities and have resolved the associated developmental crises to some extent. The ego strength flowing from a successful resolution of this stage is wisdom. Individuals who possess a sense of integrity and the virtue of wisdom can tolerate the closeness of death, and have a disconnected, but active concern with life (Erikson, 1978).

When individuals fail to attain integrity, they may become disgusted with the external world and contemptuous of individuals and institutions (Sadock et al., 2007). Erikson (1978) suggested that for those who could not accept that their lives were ending or accept their choices and the outcomes of these during their lives, a sense of despair would prevail. With this sense of despair, would come either depression, or a desperation to hold onto as much as possible for oneself, or a complaining and bitter interaction style with others (Watson et al., 2002).

### 3.4 Criticism and Praise of Erikson's Theory

Although regarded as one of the best-known and most influential contemporary psychoanalysts, especially in developmental psychology (Meyer et al., 2008), Erikson's theory is not without critique or praise.

Firstly, Erikson is criticised for being too idealistic and optimistic. In 1976, Roazen faulted Erikson for being an idealist, by highlighting that although he appreciated his work for being visionary, original, humane, and contributing comprehensive concepts, Erikson's idealism distorted his work and that he was ill-informed of basic conflicts in society. Others noted that his theory was ineffective in supplying realistic or practical explanations of psychosocial development, which overrates the adaptive and integrative functions of the ego (Lacan, 1977; Maier, 1988). Erikson admitted that derived from clinical interpretations, his theory might have given way to either the fatalistic view of the psychopathologist or the optimism of the therapeutic ideal (Erikson, 1978).

A second criticism of Erikson's theory was its being too ambiguous and unscientific. Hoare (2005) and Welchman (2000) noted that because of the ambiguity in naming fundamental developmental concepts, Erikson's theory is difficult to operationalise, and that it flows mainly from unverified speculation. In contrast, Corsini & Marsella (1983) stated that a fair amount of research supports Erikson's ideas, especially identity studies. Particularly regarding the adolescent stage, Marcia (1966) has studied and supported his theoretical approach. Erikson's knowledge and thoughtful observation during psychotherapy, especially with children, compensate for any deficiency in scientific and experimental experience (Meyer et al., 2008). Hergenhahn and Olson (2003) contended although many of his ideas were difficult to test empirically, scholars still consider Erikson's theory as one of the most useful developed psychological theories. Several concepts formulated by Erikson are still widely used in everyday terminology.

A third criticism holds that Erikson's theory was overly descriptive and devoid of explanation. Hook (2002) noted that while Erikson's theory offers an in-depth explanation of how psychosocial development takes place, it lacks a description of why changes occur. Neither is the theory explicit enough about how an individual could resolve each developmental stage; nor does it explain the distinct personality differences that exist among individuals (Shaffer, 1996). In response to his theory not explaining the developmental delays and their effect on

future development more clearly, Erikson (1975) claimed that the idiographic nature of development prevented definitive descriptions. This suggests that the distinctive way in which individuals meet and deal with developmental crises is based on the existing level of an individual's development, and may differ significantly between individuals. Erikson himself was convinced of the possibility that his theory may be recognised as an ascending list of developmental trials, which would be "eagerly accepted by some as a potential inventory for tests of adjustment, or as a new production schedule in the manufacture of desirable children, citizens, or workers" (Erikson, 1964, p. 135).

Moreover, Erikson has been criticised for treating the male as the norm of human development, where females only featured as a variation to normal psychosocial development (Hook, 2002; Maier, 1988). Nevertheless, Douvan (1997) pointed out that Erikson's emphasis on male development reflected the era in which he lived. The weight given to trust, intimacy, and generativity, and the importance of feeling and awareness, also confirm qualities that resonate with women's development. He also praised Erikson's theory for embracing the notion that development endures into adulthood and that people have the ability to recreate the outcomes of adversity and distortion brought onto them in childhood.

Although Erikson based his ideas on thoughtful cultural observations, another prevailing criticism is that his conceptualisations are primarily individualistic (Craig & Baucum, 2002). Cross-cultural applications of Erikson's theory may be limited, owing to the strong twentieth-century capitalistic Western values that motivated it. This is evident with virtues such as independence, initiative, and industriousness, which reflect qualities specifically wanted within a competitive, individualistic, and capitalistic society, rather than reflecting universal values (Hook, 2002).

### **3.5 Chapter Summary**

This chapter provided the reader with a description of Erikson's (1959) psychosocial development theory as a guide to uncovering the intricacies of personality development. It offered a description of several concepts fundamental to Erikson's theory, and a brief explanation of each of the eight stages as they occur across the human lifespan. It described the interaction between the individual and his or her environment, highlighting the psychosocial crises, the consequence of successful and unsuccessful resolution, as well as the psychosocial

virtue pertaining to successful resolution as they relate to each stage. The chapter concluded with a discussion of some criticisms as well as contributions of Erikson's theory.

## **CHAPTER 4**

### **METHODOLOGY**

#### **4.1 Chapter Preview**

There are several methodological considerations that psychobiographers need to address. The following considerations are described in this chapter: (a) research aims, (b) research design, (c) sampling, (d) data collection, (e) data processing and data analysis, (f) considerations regarding methodological challenges, (g) ethical considerations, and lastly, (h) reflexivity.

#### **4.2 Research Aims**

The research objectives of this study are:

1. To explore and describe the life of Marie Curie by applying Erikson's (1959) theory of psychosocial development.
2. To examine the applicability and appropriateness of Erikson's theory to Curie's personality development.
3. To contribute towards the South African psychobiographical research project.

#### **4.3 Research Design**

This psychobiographical study employs a qualitative, morphogenic, single-case research design (Bromley, 1986; Nieuwenhuis, 2010; Yin, 2006). This study is psychobiographical, because it explores the life of an extraordinary individual with the objective to uncover and reconstruct the life psychologically (Fouché & Van Niekerk, 2010). Psychobiographies are typically exploratory and descriptive in nature, reflected in this study by providing an in-depth exploration and thick description of Curie's personality development within her particular socio-historical context (Fouché & De Vos, 2005; Neuman, 2006; Yin, 2006). Qualitative data deals with descriptions of lived experiences, actions, perceptions and interpretations of an individual within his or her environment, and transforms it into a narrative (Berg, 2001). The morphogenic aspect of the psychobiographical method emphasises the uniqueness and individuality of the whole person, rather than individuality found in a single element or isolated events (Lindegger, 2006; Runyan, 1983). This study also forms part of life history research and aims to examine a single case over the entire lifespan (Nieuwenhuis, 2010; Runyan, 1988a). Yin (2009) stated that the strength of a single case study lies in its ability to deal with a variety of evidence from artefacts, documents, interviews, and observations. Case studies provide a very efficient and

flexible tool in the assessment and treatment development and evaluation processes, and are therefore used to test theory propositions, contributing to knowledge and theory building (McAdams, 1988, 1994; Yin, 1994). They reveal the descriptive dialogic nature of the study, which informally validates or disproves the theoretical propositions and conceptualisations thereof. This is done by comparing research findings with expected results or theoretical models (Edwards, 1998; Fouché, 1999).

#### **4.4 Sampling**

Psychobiographical research usually focuses on the lives of extraordinary individuals (Elms, 1994; Runyan, 1982b; Simonton, 1994). Purposive sampling permits the selection of particular individuals, who is information rich, with a specific purpose in mind (Maree & Pietersen, 2010; Patton, 1990). The researcher purposefully selected Curie as psychobiographical subject, because of her uniqueness and exceptional achievements. Curie's uniqueness lies in her being the only woman to receive Nobel Prizes in two different scientific fields. These awards acknowledge her exceptional achievement as a pioneer of radiology through her discovery of polonium and radium. Moreover, an extensive search conducted during April 2013, involving several electronic databases and search engines (i.e., Academic Search Complete, Google Scholar, JSTOR, PsycARTICLES, PsycBOOKS, PsycINFO, Sage Journals Online, and Science Direct), revealed that no previous psychobiographical studies on Curie's personality development across her lifespan had been done.

#### **4.5 Data Collection**

The search for, selection, and collection of published data sources on Curie were done via the World Wide Web, the EBSCOhost databases, and the information systems at the Rhodes University Library. Biographical data was collected from primary (produced by the subject), and secondary sources (provided by others) (Elms, 2007; Simonton, 2003). In Table 4, the most notable sources used are listed. The benefit of documenting the complete range of data sources is that it increases the study's dependability during the data-collection phase (Fouché, 1999; Krefting, 1991; Denzin & Lincoln, 2000). Rudestam and Newton (2007) added that published materials are stable sources of data that could repeatedly be studied, valuable for confirmation of dates and accurate spelling of names and titles, helpful when validating the accuracy of the





theory of psychosocial development (1959) was used to guide the extraction of salient information.

#### **4.6.2 Data Display**

Once reduced, organising the selected data in such a way that shows the credible information may be problematic (Alexander, 1990). The researcher must consider the indications in the data that direct how an individual's life narrative is to be discovered, shaped, and told (McAdams, 1994). To assist with this process, Miles and Huberman (1994) suggested the use of matrices or charts to display data. These allow the data to be more accessible and concise, which facilitates immediate focus on particular or significant points in the data. The researcher made use of a data-collection and analysis matrix to display, sort and analyse the selected data (refer to Table 5). This table was used by the researcher to cross-reference significant episodes in Curie's life with Erikson's eight stages of psychosocial development. Data deemed relevant to the psychosocial crisis in each stage were then displayed.

#### **4.6.3 Conclusion Drawing and Verification**

This is the last step of the data processing and analysis process. As suggested by Miles and Huberman (1994), the researcher considered the analysis process as a whole from the start of data collection, and systematically sifted through the data as it was collected. Preliminary conclusions, patterns, and discrepancies were noted. Miles and Huberman (1994) noted that as the data reduces, the preliminary conclusions may change. However, the pattern of conclusion drawing should be present throughout the process, subject to change and modified as new information becomes available. Although assumptions and conclusion drawing may begin at the start of data collection, Green, Camilli and Elmore (2006) suggested that the researcher should attempt to keep an open mind throughout the process.

These three steps are inter-reliant and part of the same procedure. The procedure can be perceived as a cyclic and on-going process; when new data are collected and added, the display could change, resulting in new conclusions being drawn (Miles & Huberman, 1994). During this study, the researcher remained mindful that all assumptions were tentative, and remained open as well as critical.

Table 5

*Data-Collection and Analysis Matrix*

<b>SIGNIFICANT EPISODES IN CURIE'S LIFE</b>	<b>STAGES OF PSYCHOSOCIAL DEVELOPMENT</b>							
	Basic trust vs. mistrust	Autonomy vs. shame/doubt	Initiative vs. guilt	Industry vs. inferiority	Identity vs. confusion	Intimacy vs. isolation	Generativity vs. stagnation	Integrity vs. despair
	Birth – 18 months	18 months – 3 yrs.	3 – 5 yrs.	5 – 13 yrs.	13 – 21 yrs.	21 – 40 yrs.	40 – 60 yrs.	60 yrs. – death
<i>Birth and infancy</i>								
<i>Little "Manya"</i>								
<i>Troubled times</i>								
<i>Early education</i>								
<i>Death and desolation</i>								
<i>Friendship and rebellion</i>								
<i>Top of the class</i>								
<i>A blithe year</i>								
<i>The Flying University</i>								
<i>Governess</i>								
<i>First love</i>								
<i>An unclear future</i>								
<i>Student days</i>								
<i>Curie and Pierre</i>								
<i>Partnership</i>								
<i>Motherhood</i>								
<i>A time of discovery</i>								
<i>Loss and regret</i>								
<i>Nobel Prize</i>								
<i>Family first</i>								
<i>Tragedy</i>								
<i>Misery and submersion</i>								
<i>Convictions about education</i>								
<i>The affair</i>								
<i>Disgrace and honour</i>								
<i>Illness and recovery</i>								
<i>War and aftermath</i>								
<i>Social action</i>								
<i>USA</i>								
<i>Continued work and activism</i>								

SOCIOECONOMIC, HISTORICAL AND CULTURAL INFLUENCES

Table continues

<b><i>SIGNIFICANT EPISODES IN CURIE'S LIFE</i></b>	<b>STAGES OF PSYCHOSOCIAL DEVELOPMENT</b>							
	Basic trust vs. mistrust	Autonomy vs. shame/doubt	Initiative vs. guilt	Industry vs. inferiority	Identity vs. confusion	Intimacy vs. isolation	Generativity vs. stagnation	Integrity vs. despair
	Birth – 18 months	18 months – 3 yrs	3 – 5 yrs	5 – 13 yrs	13 – 21 yrs	21 – 40 yrs	40 – 60 yrs	60 yrs – death
<i>Heritage</i>								
<i>Persistence</i>								
<i>Physical decline</i>								
<i>Final days and legacy</i>								

SOCIOECONOMIC,  
HISTORICAL AND  
CULTURAL  
CONTEXT

*Note.* The data collection and analysis matrix is based on Erikson's (1959; 1975) psychosocial stages and Curie's life history (Curie, 1923, 1937; Goldsmith, 2005; Ogilvie, 2004).

## 4.7 Methodological Challenges

### 4.7.1 Explicit Subjectivity

Elovitz (2003) warned that the psychobiographer could be less critical and inclined to act on countertransference feelings evoked from the subject. Critical self-examination and reflexivity are required, especially where the subject is either popular or disliked by the general public. Moustakas (1994) noted that researchers must define their relationship with the subject and set out their preconceived notions and expectations. To address this concern, the researcher was involved with the available literature by means of continuously reflecting on how the subject was portrayed, as well as what prejudices and emotions the researcher may have had about the subject (Anderson, 1981). During research supervision and discussions with colleagues, the researcher received objective feedback that supported the maintenance of objectivity.

### 4.7.2 Analysing an Absent Subject

Gaining a holistic picture of an absent subject is challenging, as it implies limited information, and a subject who is unable to provide his or her opinion regarding documentation (Anderson, 1981). Although, unlike information gained in a therapeutic setting where the focus is usually on maladaptive behaviour, psychobiographical data has the advantage that the information gained is not limited (Elms & Song, 2005; Runyan, 1988a). Since the researcher has information that spans the subject's entire life, obtained from various sources, longitudinal analysis and descriptions of behaviour are done in a balanced way (Anderson, 1981; Elms, 1994; Green et al., 2006). During this study, the researcher used various resources to obtain a holistic view of Curie.

### 4.7.3 Cross-Cultural Differences

Psychobiographical research is regarded as a cross-cultural exploration, where the cultural context of the subject often differs from the present day and social context of the researcher (Anderson, 1981; Fouché, 1999; Runyan, 1982b). Curie's lifetime and social background are not concurrent with or similar to that of the researcher. To address these differences, and gain an anthropological, in-depth and empathic historical understanding (Anderson, 1981) of Curie's life from her viewpoint (Neuman, 2006), the researcher consulted both primary and secondary sources of information relevant to Curie. In addition, many modern psychological concepts are not sensitive to cross-cultural differences, and therefore may not apply to the subject. However, Erikson's (1959) theory was developed in Europe and pertinent during Curie's lifetime and context.

### 4.7.4 Reductionism

Reductionism may occur in several ways. One way is when a single factor or a small amount of data is used to describe complex processes (Schultz, 2005). In a well-implemented psychobiography, childhood experiences that are influential and significant ought to be considered as an aspect relating to personality development, and not regarded as the only factor involved (Schultz, 2005). Mack (1971) referred to these as *critical period fallacy* and *eventism*. Critical period fallacy refers to when the study of an individual's life is constructed around particularly perilous periods in an individual's life, while eventism emphasises a single precarious event as significant to understand the subject's development through adulthood (Mack, 1971). To address reductionism, the researcher acknowledged the social and cultural contexts of the subject, together with the complexity of human character (Anderson, 1981; Fouché & Van Niekerk, 2005). Ponterotto (2014) noted that an "appropriate goal for the psychobiographer is expansionism, referring to a holistic, comprehensive, full life review of the historical subject" (p. 81). Erikson's life span theory of psychosocial development used to investigate Curie's development from birth to death supplied the reader with a comprehensive, full life review.

Reductionism may also occur when findings are based on rigid psychological principles or fixed psychological formulas. It leads the researcher to focus on psychological factors alone, and to overlook social and historical contexts (Runyan, 1988b). Ponterotto (2014) acknowledged that it was "difficult to accurately understand and interpret life through a single theoretical lens"

(p. 81). However, he added “single anchoring models have value if they are comprehensively understood and applied if the researcher’s biases are in check, and if the methodology is comprehensive and rigorous” (Ponterotto, 2014, p. 84). The conclusions were drawn around Curie’s emergent life story, rather than fitting it into the selected theoretical model, as a means to address theoretical flexibility and eclecticism (Anderson, 1981, Runyan, 1982a; Schultz, 2005).

Over-pathologising is also reductionistic and occurs when the focus is on the psychopathology or psychological problems of the subject, which obscures the internal strengths and resources of the subject, therefore failing to consider normal limits of behaviour (McAdams, 1994; Schultz, 2005). The researcher attempted to assess Curie’s development objectively and holistically, through reflecting on healthy and unhealthy behaviours.

#### **4.7.5 Trustworthiness of Data**

Any research project requires methods that are dependable, reliable, verifiable, and replicable. However, there are limited guiding principles for qualitative studies to guard against misinterpretations and to draw invalid or unreliable conclusions (Miles & Huberman, 1994). To assure design quality, Yin (2003) advocates the use of the following four checks.

**4.7.5.1 Credibility.** Credibility refers to the accurate interpretation of the available data, which should contribute to the truth, as opposed to being fabricated (Neuman, 2006; Runyan, 1983). To ensure credibility, the researcher spent enough time submerged in and engaged with the available data, to ensure the credibility of patterns, identify misinterpretations or distortions, and ensure thorough research (Krefting, 1991; Neuman, 2006; Rudestam & Newton, 2007; Runyan, 1983).

**4.7.5.2 Transferability.** Transferability indicates the extent to which findings can be generalised to other research or contexts (Fouché & De Vos, 2005; Krefting, 1991; Denzin & Lincoln, 2000; Runyan, 1983). In psychobiographical research, the main objective is to describe and explain the life being studied, and not to generalise findings. Therefore, some theorists (Fouché, 1999) have argued that transferability is less important in psychobiography, where the findings are considered to have descriptive value. The researcher did not intend to fulfil the criteria for transferability since the generalisation of the findings to a wider population or setting was not an objective.

**4.7.5.3 Dependability.** Dependability refers to the consistency of findings, which suggests that when data-collection and analysis procedures are repeated, they will produce similar results. When a researcher uses various sources, it allows different lines of enquiry to merge, which contribute to the quality of the study and confident interpretations (Alexander, 1988; Fouché, 1999; Krefting, 1991; Yin, 2009). Moreover, the quality and credibility of the research rests on logic, precise and detailed writing about the data collection, analysis, and interpretive methods. Ponterotto (2014) noted that it provides a “sense of verisimilitude (as if one were present)” (p. 87), making it easier to replicate the study. To address dependability, the researcher consulted a wide range of resources and paid attention to context, detail, and data triangulation (Denzin & Lincoln, 2003; Ponterotto, 2014). Data triangulation was integrated into the data analysis matrix, where every block of the matrix required the researcher to search for evidence of the specific theoretical concept particular to each life stage.

**4.7.5.4 Confirmability.** Confirmability refers to objectivity, where research findings are based on the information about and situations inherent to the research, and thus are free from researcher bias (Edwards, 1998; Fouché & De Vos, 2005; Krefting, 1991). Objectivity in turn increases trustworthiness (Denzin & Lincoln, 2000). The measures previously discussed under explicit subjectivity were used to address confirmability. An audit trail was also established in which the researcher kept an accurate record of the raw data used during the data reduction and analysis procedures (Krefting, 1991).

#### **4.7.6 Elitism and Easy Genre**

Elitism refers to the opinion that psychobiography disregards the general population and only focuses on privileged individuals (Runyan, 1988a; Schultz, 2005; Simonton, 1994). Howe (1997) and Runyan (1988a) countered that one should remember that the focus is on human personality development and that a research subject from any context or class can be chosen. Runyan (1988a) noted that critics assume that writing a psychobiography is easy since it traces a predictable path, based on developmental theories that span across a subject’s life. It may be true for poorly written psychobiographies, as it is for any poorly conducted research, but is untrue for a psychobiography where a plethora of data were collected, and intricate psychological knowledge has been applied comprehensively to describe the subject’s life (McAdams, 1994; Schultz, 2005). The researcher opposes this claim of its being easy, since researching Curie’s

multifaceted and extraordinary life has proved to be a painstaking and difficult task. The study required careful organisation and consideration of the large amount of data collected.

#### **4.7.7 Inflated Expectations**

Researchers should be mindful that their explanations are additions to others' explanations, not substitutions, and they should remain speculative rather than certain (Anderson, 1981). The researcher acknowledges that the findings remain speculative, and admits that no single psychological theory provides all answers for behaviour and development. Erikson's theory of psychosocial development offered insight within the limitations of what the theory had to offer.

#### **4.7.8 Ethical Considerations**

The nature of a psychobiographical study raises ethical concerns about privacy and confidentiality. The psychobiographer provides a coherent and balanced portrayal of an individual's lived life; therefore, it is necessary to consider and resolve the unique ethical challenges. These challenges may result from the researcher's subjective and sustained collaboration with the research subject (Elms, 1994; Ponterotto, 2010; Runyan, 1982b). Runyan (1983) encouraged psychobiographers to consider at least two ethical issues: (a) invasion of privacy, and (b) potential embarrassment or harm to the subjects, and their relatives or associates. This study was conducted in accordance with the Health Professions Council of South Africa ethics and the 1976 ethical guidelines set out by the American Psychiatric Association, which state that psychobiographical studies are preferably carried out on long-dead persons with no close surviving relatives (Elms, 1994). Curie died 80 years ago; therefore, it was unlikely that any surviving relatives could be harmed or humiliated by this study.

Other ethical issues could relate to which data are acceptable to use, for instance, officially archived materials, materials deemed suitable by the subject's family, or all available material. Likewise, the psychobiographer, who hopes to publish findings, must also decide what goes to print, whether the publication is to be diplomatic, but honestly phrased, or only what the subject's family wants to hear (Elms, 1994; Fouché, 1999). For this reason, the researcher used only published materials available in the public domain and caution was taken when interpreting and presenting the data. Elms (1994) also recommended that speculation beyond the realm of available data should be avoided. Therefore, all interpretations were comprehensively reviewed



during supervision, which aided the researcher's ability and safeguarded against speculation beyond what the data suggested. Reflective practices were also used to aid supervision, which made the researcher aware of any possible subjective conclusions.

Although the abovementioned caveat does not significantly emphasise confidentiality, Elms (1994) suggested that the psychobiographer should treat all intimate knowledge and documentation with respect and that every psychobiography needs to be ethically justified to some degree. He noted "ethical psychobiography does not just avoid the unethical; it adds to our human understanding of ourselves and other human beings" (Elms, 1994, p. 255). All facts and records regarding Curie's life were treated with respect during this psychobiographical study.

#### **4.8 Reflexivity**

Reflective practice was defined by Boroş (2009) as "the process involved in making sense of events, situations, or actions that occur in practice settings; reflection in this sense, emphasises a thoughtful approach to understanding experience, whether in real time or retrospectively" (p. 23). Reflexivity must form part of psychobiographical study due to the notion that a person's thoughts and ideas tend to be inherently biased. Reflexivity is a characteristic of qualitative research and requires the researcher to be mindful of his or her own contribution to the meaning and knowledge construction throughout the study (Macbeth, 2001).

There are two kinds of reflexivity: personal and epistemological. Personal reflexivity notes how a person's values, beliefs, acquaintances and interests impact his or her research or work. Epistemological reflexivity endeavours to recognise the foundations of knowledge and the implications of any findings (Willig, 2008). Reflective thinking entails the subsequent four features: (a) developing an understanding of the current issue; (b) observing the appropriate conditions to enrich that knowledge; (c) expansion on a conclusion; and (d) testing that conclusion (Oelofsen, 2012).

Woll (2013) proposed that a process diary should be used to assist the researcher to remain objective, by means of being reflective, descriptive and culture appreciative. During this study, the researcher diarised the fourfold reflective thought process as described by Oelofsen (2012). All conclusions drawn were discussed and deliberated during supervision and informally with colleagues.

#### **4.9 Chapter Summary**

This chapter has provided an overview of the fundamental methodological considerations relevant to the qualitative approach, and in particular to the psychobiographical study of Curie. The relevant methodological considerations were described, which included research aims, design, and sampling method. A description of the data collection, processing and analysis procedures were given. Lastly, methodological challenges, ethical considerations, and reflexivity also received attention.

## CHAPTER 5

### RESEARCH FINDINGS AND DISCUSSION

#### 5.1 Chapter Preview

This chapter presents and discusses research findings relevant to the psychosocial personality development of Curie. The researcher superimposed the findings upon Erikson's eight stages of psychosocial development and integrated the stages with particular periods of Curie's life (as per the matrix presented in Chapter 4; also see Appendix C). Each of the eight sections begins with a summary of the psychosocial stage as proposed by Erikson (1968, 1978), with the aim to orientate the reader in respect of the psychosocial crisis and relevant strengths or virtues. The researcher then presents the findings of each particular period. The findings are followed by a discussion related to the relevant psychosocial strength or virtue of that stage (see Table 6). The reader is also referred to Appendix D, which supplies a timeline of Curie's life events and accomplishments in relation to the eight stages.

#### 5.2 Research Findings and Discussion

##### 5.2.1 Childhood (1867–1880)

**5.2.1.1 Stage 1: Basic trust versus mistrust (Birth–18 months).** During this stage, infants are reliant on their parents to establish meaningful relationships. If parents, mainly the mother, are responsive to their babies' needs in a predictable and sensitive way, infants develop trust. Trust, according to Erikson (1963), is a state of being and responding. In this state, infants need to trust the constancy of the caregiver and the external world and have an inherent belief that they will be able to cope with intrinsic needs. When individuals develop trust they gain the capacity to have hope in the face of adversity and the belief that they can resolve difficult challenges (Erikson, 1968, 1978).

##### 5.2.1.2 Stage 1 findings.

***Birth and infancy.*** Curie was born in Warsaw, Poland, on 7 November 1867. She was the fifth and youngest child of teacher Bronislawa Skłodowski and Professor Władysław Skłodowski. Curie's older siblings were Zofia, Józef, Bronislawa (referred to as Bronya), and Helena (Goldsmith, 2005). For the reader to gain a better understanding of Curie's historical context, there is merit in providing a brief description of the reigning political atmosphere at the

Table 6.

*A Structural Outline of the Findings of this Study*

LIFE SPAN	PSYCHOSOCIAL STAGE	BIOGRAPHIC SUBHEADINGS
<b>Childhood (1867–1880)</b> <i>This section maps Curie's life in Warsaw from birth until 13 years of age.</i>	<b>Stage 1: Basic Trust versus Mistrust</b> (Birth to 18 months)	<ul style="list-style-type: none"> <li>• <i>Stage 1 findings</i> <ul style="list-style-type: none"> <li>▪ Birth and infancy</li> </ul> </li> <li>• <i>Stage 1 discussion</i></li> </ul>
	<b>Stage 2: Autonomy versus Shame and Doubt</b> (19 months to 3 years)	<ul style="list-style-type: none"> <li>• <i>Stage 2 findings</i> <ul style="list-style-type: none"> <li>▪ Little "Manya"</li> </ul> </li> <li>• <i>Stage 2 discussion</i></li> </ul>
	<b>Stage 3: Initiative versus Guilt</b> (3 to 5 years)	<ul style="list-style-type: none"> <li>• <i>Stage 3 findings</i> <ul style="list-style-type: none"> <li>▪ Troubled times</li> </ul> </li> <li>• <i>Stage 3 discussion</i></li> </ul>
	<b>Stage 4: Industry versus Inferiority</b> (5 to 13 years)	<ul style="list-style-type: none"> <li>• <i>Stage 4 findings</i> <ul style="list-style-type: none"> <li>▪ Early education</li> <li>▪ Death and desolation</li> <li>▪ Friendship and rebellion</li> </ul> </li> <li>• <i>Stage 4 discussion</i></li> </ul>
<b>Adolescence and Early Adulthood (1880–1888)</b> <i>This section covers the last of Curie's school years until she left her post as governess.</i>	<b>Stage 5: Identity versus Role Confusion</b> (13 to 21 years)	<ul style="list-style-type: none"> <li>• <i>Stage 5 findings</i> <ul style="list-style-type: none"> <li>▪ Top of the class</li> <li>▪ A blithe year</li> <li>▪ The Flying University</li> <li>▪ Governess</li> <li>▪ First love</li> </ul> </li> <li>• <i>Stage 5 discussion</i></li> </ul>
	<b>Stage 6: Intimacy versus Isolation</b> (21 to 40 years)	<ul style="list-style-type: none"> <li>• <i>Stage 6 findings</i> <ul style="list-style-type: none"> <li>▪ An unclear future</li> <li>▪ Student days</li> <li>▪ Curie and Pierre</li> <li>▪ Partnership</li> <li>▪ Motherhood</li> <li>▪ A time of discovery</li> <li>▪ Loss and regret</li> <li>▪ Nobel Prize</li> <li>▪ Family first</li> <li>▪ Tragedy</li> </ul> </li> <li>• <i>Stage 6 discussion</i></li> </ul>
<b>Adulthood (1888–1927)</b> <i>This section covers Curie's life in Paris. It spans the time from her student days at the Sorbonne to her work as scientist and lecturer. It also includes her private and social life until old age.</i>	<b>Stage 7: Generativity versus Stagnation</b> (41 to 60 years)	<ul style="list-style-type: none"> <li>• <i>Stage 7 findings</i> <ul style="list-style-type: none"> <li>▪ Misery and submersion</li> <li>▪ Convictions about education</li> <li>▪ The affair</li> <li>▪ Disgrace and honour</li> <li>▪ Illness and recovery</li> <li>▪ War and aftermath</li> <li>▪ Social action</li> <li>▪ United States of America</li> <li>▪ Continued work and activism</li> </ul> </li> <li>• <i>Stage 7 discussion</i></li> </ul>
	<b>Stage 8: Integrity versus Despair</b> (61 years until death)	<ul style="list-style-type: none"> <li>• <i>Stage 8 findings</i> <ul style="list-style-type: none"> <li>▪ Heritage</li> <li>▪ Persistence</li> <li>▪ Physical decline</li> <li>▪ Final days and legacy</li> </ul> </li> <li>• <i>Stage 8 discussion</i></li> </ul>
<b>Curie's Final Years (1927–1934)</b> <i>This final section covers the last six years of Curie's life.</i>		

time. Already by 1815, neighbouring countries had subdivided and consumed Poland through wars and treaties. Warsaw became a provincial city of the Russian Empire in the section controlled by Tsar Alexander (Emling, 2012).

By the time Bronislawa was pregnant with Curie, she had resigned from her teaching post and began to home school Zofia and Józef (Goldsmith, 2005; Ogilvie, 2004; Quinn, 1995). Curie's mother was enduring and thoughtful, and had an "unusual patience and understanding for children" (Quinn, 1995, p. 28). In her autobiographical notes, Curie described her mother as good natured and tolerant, with a big heart and a great sense of duty. Curie loved and admired her mother and noted that her mother had an extraordinary influence over her (Curie, 1923). However, Curie's mother was ill. The first signs of tuberculosis had appeared soon after Curie's birth. Fearing contagion, she enforced strict rules upon herself, which caused her never to embrace or kiss Curie or her siblings (Curie, 1937; Ogilvie, 2004; Quinn, 1995). However, someone had to take care physically of Curie. At the time, it was common practice for women to hire wet nurses and nannies to take care of these duties. The Curies also employed servants who took care of the household duties and cooking (Curie, 1923). The researcher extrapolates that servants, a possible wet nurse, and Curie's older sisters were responsible for taking care of her physical needs.

**5.2.1.3 Stage 1 discussion.** Because of limited information regarding Curie's first 18 months of life, the inferences drawn are highly speculative. During Stage one, infants have to depend entirely on primary caregivers to take care their basic needs. Therefore, the corresponding social modality is to provide what infants need (Erikson, 1965). This relationship moderates the extent to which infants learn to trust their environment. It is apparent that Curie learned to accept food, warmth, love, and safety that others offered, but seemingly not from her mother. However, Erikson (1965) held that it was the quality of the relationship with the principal caregiver that was critical, not the amount of frustration or deprivation experienced. Children do not become neurotic from "frustrations", but rather from the absence or loss of societal meaning in frustrations (Erikson, 1965, p. 241). Although Curie's mother was a loving parent, her refusal to physically hold or comfort Curie left her feeling confused and rejected. This ambivalent mothering possibly led to Curie's having difficulty in developing trust. Welchman (2000) noted that mistrust develops from unavoidable natural frustrations, parental inadequacy, and absence. Mistrust may also be the consequence of defensive splitting, the

process of separating the inner from the outer self, accompanied by projections, introjections and even distortions of reality. Curie's possible lack of trust may have transcended to other significant figures in her life and the external world. Basic trust is essential because it forms the foundation of self-trust, which individuals require for later development (Hook, 2002). This stage is responsible for the formation of an enduring lifelong pattern, during which these initial adaptive qualities might filter a person's emotional state (Sowers & Dulmus, 2008). If mistrust grows, individuals tend to withdraw to protect themselves (Erikson, 1978).

To avoid data duplication and demonstrate that Curie possibly did not develop adequate trust, the researcher refers the reader to evidence from later stages that pointed to the formation of a lasting pattern of withdrawal, depression, and defensive splitting. Curie faced many trials and disappointments throughout her life, which she eventually overcame. Still, at the onset of these trials and disappointments, the literature describes Curie as withdrawn and suffering from depression. Curie often referred to these episodes as "fatigue" or "exhaustion" or "my nervous troubles" (Goldsmith, 2005, p. 29). Curie presented with episodes of depression and withdrawal when she worked as a governess and fell in love for the first time (see Stages 4 to 6). Other depressive episodes occurred during the affair and while suffering from ill health during Curie's middle and late adult years (see Stages 7 and 8). Curie isolated herself to cope with hardships manifested when her sister, mother, and husband died (see Stages 4, 6 and 7). Although sadness and anger are normal responses to grief and loss, cumulative evidence in later stages suggests that Curie experienced intense and quickly roused emotions that lasted for extended periods (Ogilvie, 2004; Quinn, 1995). In her late adult years, Curie made the self-observation, "I feel everything very violently, with a physical violence" (Quinn, 1995, p. 47).

On the other hand, the psychosocial theory holds that if individuals develop an essential sense of trust and become involved with others, the ego strength of hope develops. To conclude that Curie incorporated no hope would contradict Erikson's (1975) focus on "outward, forward, upward" (p. 39). Trust manifested as hopefulness in several ways in the studied literature. For example, Curie established several healthy relationships during her lifetime, which indicated a developing trust in others (see Stages 6 and 7). For most of her life, while being subjected to hardships, Curie remained hopeful and encouraged about the future, which was evident in her continued work and research (see Stages 7 and 8). In her middle adult years, Curie expressed hope when the war broke out (see Stage 7).

The researcher, therefore, concludes that Curie had probably developed a larger sense of mistrust than trust in her environment and dealings with others. She may have learned that the world is not always a safe place, which led to cynicism and isolation as a coping mechanism. Data suggest that Curie revisited and challenged her ambivalence about trusting and distrusting the world and people around her, throughout her life. A lifelong pattern of despair and depression triggered by grief or loss, which led to periods of isolation and submersion in her work, is evidence of that.

**5.2.1.4 Stage 2: Autonomy versus shame and doubt (19 months–3 years).** During this stage, children try to make sense of their environment by attempting to master and gain control over it. If parents provide the framework for children to learn tasks and routines, autonomy and a sense of self-esteem develop. As adults, these individuals are patient and have confidence in their skills to overcome life challenges (Carr & McNulty, 2006; Erikson, 1968). Erikson (1965) noted that there is a decisive ratio between over-protected and distant parenting. The ratio determines whether children develop a lasting “sense of goodwill and pride” or a “sense of loss of self-control” which leads to shame and doubt (Erikson, 1965, p. 246).

#### **5.2.1.5 Stage 2 findings.**

*Little “Manya”.* Although the literature gave some indication of Curie’s mother and father’s characters and home environment, it lacks information concerning her upbringing during the first three years. Descriptions of Curie’s development and upbringing are only available from the age of four and onwards. The available primary and secondary literature also placed more emphasis on Poland’s political history and the endemic oppression at the time.

Even though the political events and Bronislawa’s illness troubled the Skłodowskis, Józef described this as a happy time (Quinn, 1995). Curie’s siblings noted that she was the “best-loved in the house,” with the most nicknames (Curie, 1937, p.5). Nicknames are common in Poland, and every Skłodowski child had at least one. Curie’s ordinary diminutive was “Manya,” an affectionate nickname was “Manyusya,” and “Anciupecio” a comical name from her early infancy (Curie, 1937).

At home, throughout the oppression and her deteriorating health, Curie’s mother continued to be an active homemaker who always presented as neatly dressed and high spirited (Curie, 1937). Curie remembered no greater happiness than to crouch “as close as possible to the pensive and charming figure” and feeling confused by smiles or affectionate looks (Curie, 1937,

p. 5). Although Curie received acknowledgement, it was difficult for her to understand the lack of physical contact with a mother who orally declared her love. Curie, who longed for affection, noticed the distance and felt rejected when her mother pushed her small clingy hands aside (Goldsmith, 2005; Ogilvie, 2004; Quinn, 1995).

Curie knew very little about their mother's disease. Bronislawa was determined not to let anybody notice her suffering. The only indications of her illness were the dishes and cutlery reserved for her use only, the continued lack of physical contact, attacks of dry coughing, and their father's bleak expression (Emling 2012). Curie became accustomed to the short phrase, "Restore our mother's health" that was added to evening prayers (Curie, 1937, p. 8). The customs of that time regulated a distance between parents and children. Curie's parents had complete authority and required their children to address them in a formal manner (Goldsmith, 2005). They also taught Curie and her siblings to be obedient and prohibited them from asking questions, especially regarding their mother's health (Ogilvie, 2004).

**5.2.1.6 Stage 2 discussion.** It appears that Curie may have experienced both protected and distant parenting. Being the youngest and best-loved could indicate that Curie's parents and siblings felt very protective over her. Protected parenting also manifested through her mother's actions to safeguard Curie and her siblings from her illness. This protectiveness could have hampered Curie's developing autonomy and facilitated the development of dependency. It could have led her to experience a sense of loss of self-control, causing embarrassment and uncertainty. The strict parenting traditions of the time could also have restricted Curie's growing autonomy. Being unable to ask questions about her mother's illness may have caused Curie to feel confused and uncertain, which could have promoted shame and self-doubt (Erikson, 1965).

However, when parental control is constructive, children develop an appropriate sense of autonomy and personal agency, which leads to self-reliance and independence. It also fosters in children the ability to acquire new skills. During Stage 2, children must begin to take some personal responsibility for feeding, dressing, and bathing themselves. If all goes well, the child acquires a sense of self-sufficiency. Even though there were servants, Curie possibly had to learn how to take care of most of these duties herself, which supported her personal agency. Although authoritative parenting and strict rules indicate distant parenting, it provided a framework in which Curie could learn tasks and routines, from which autonomy and self-esteem develop (Erikson, 1965).



For Erikson (1963) the successful resolution of this stage involves a balance where children develop the ability to control themselves and learn to decide either to hold on or to let go. Curie's mother's contradictory behaviour, together with the influences from her siblings and the authoritative rule at home, may have been confusing for Curie and caused an inner ambivalence of holding on and letting go. Sadock et al., (2007) proposed that this conflict lead to traits of inflexibility and perfectionism. Parents who excessively encourage dependency, hamper children's autonomy (Erikson, 1968). When doubt overcomes autonomy, it may result in ritualised behaviour, instigating the development of a punishing conscience. It often results in overburdening oneself and/or self-consciousness, resulting in obsessiveness, stubbornness, and obsessive-compulsive behaviours. Throughout Curie's life, she displayed traits of inflexibility, perfectionism, and obsessiveness. She also had a tendency to overwork herself (see Stages 4 to 8). Unsuccessful resolution of this stage also manifests in experiencing shame or self-doubt (Erikson, 1978). Shame is often visible as self-consciousness, which may result in a loss of self-control. Curie was renowned to dislike public appearances and deliberately tried to stay out of the public eye (Emling, 2012; Quinn, 1995; Ogilvie, 2004). This dislike may have been a reflection of Curie's self-consciousness, when shame and self-doubt resurfaced.

These traits suggest that the combination of over-protected and distant parenting may have impeded Curie's psychosocial personality development to some extent. However, satisfactory resolution of this stage implies the incorporation of the virtue, will, which stems from a sense of personal agency and autonomy (Erikson, 1950). Willpower manifested in Curie's endurance and determination throughout her life (see Stages 4 to 8).

The contradictory findings suggest that the crisis of autonomy versus shame and doubt repeatedly resurfaced throughout Curie's life. Just as Curie wavered between holding on and letting go during Stage 2, she continually wavered between a "sense of goodwill and pride" and a "sense of loss of self-control" in the years to follow. Towards the end of her life, Curie increasingly displayed a greater sense of goodwill and pride, and seemingly experienced less shame and doubt.

**5.2.1.7 Stage 3: Initiative versus guilt (3–5 years).** During this stage, children begin to investigate and explore the physical and social world and learn what acceptable behaviour is. The primary caregivers continue to play a crucial role as they guide and discipline their children, but also encourage curiosity and imagination (Erikson, 1963). They are required to understand

their children's curiosity and to establish safe limits for investigation. When children respond well to challenges, take responsibility, master new skills, and interact with peers, it leads them to develop initiative. Erikson (1963) regarded initiative as the ability to plan actions or projects and remain self-assured, despite failure or mistakes. In contrast, Erikson (1963) described guilt as the feeling that something is incorrect or that others will disprove of one's actions. Satisfactory resolution comprises a balance between taking the initiative and respecting boundaries, which leads to the incorporation of the virtue, purpose (Erikson, 1950).

#### **5.2.1.8 Stage 3 findings.**

***Troubled times.*** Besides the enduring oppression, the Skłodowski family was struggling financially. Officials forced Curie's father out of a good teaching position because of his pro-Polish beliefs, which obliged him to accept a lower paying post. The family also lost capital on an investment and chose to supplement the income by lodging boys (Ogilvie, 2004). The house became disorderly and overcrowded, which led Curie's father to reconfigure the organisation and control in their home environment. The children's time was divided into periods for study, reading, reciting Polish literature, and physical exercise (Curie, 1937; Goldsmith, 2005; Quinn, 1995). During one of these reading periods, four-year-old Curie took the book from her struggling sister and began to read. Her parents' surprised reactions caused Curie to panic and she stammered through her tears that she had not done it on purpose. She mumbled that it was not her or Bronya's fault, but only because it was so easy (Curie, 1937).

Curie's father was a caring man who not only read them bedtime stories, but also enjoyed explaining natural wonders and spending time with them. In the Skłodowski household, even games tended to be educational. He also directed these educational games. For history lessons, they made collages and for geography, they made and used colourful blocks of various shapes to represent the continents, countries, cities, mountains and rivers. Helena described how their father tolerated disorder and enjoyed their eagerness to participate in his lessons (Quinn, 1995). However, the children did not spend all their time learning. They also played outside or in their large children's playroom, while their ailing mother tolerated their loud games (Goldsmith, 2005).

Bronisława's health continued to decline. At the time, people believed that relaxing in a mild climate and drinking curative water could cure tuberculosis. Curie was four years old when her mother left home for the first curative rest in the mountains (Quinn, 1995). Unable to afford

a nurse, Zofia accompanied their mother to the mountains where they stayed for nearly two years. With the help of his sister-in-law, Curie's father took over the care of the children and the boarders (Goldsmith, 2005; Quinn, 1995). With their mother away, Wladyslaw increased the organisation of the household and became the "supreme commander of his small troop" (Goldsmith, 2005, p. 26). Józef confirmed that not only did vacations provide a relief from the constant Russian surveillance, "but a welcome break from the regimentation of their home life" (Quinn, 1995, p. 31).

**5.2.1.9 Stage 3 discussion.** During Stage 3, it is important for the primary caregivers to establish a balance between guiding and disciplining their children while encouraging curiosity and imagination (Erikson, 1963). During this stage children begin experimenting and taking initiatives that may conflict with their parents' rules. Parents need to support their children's emerging independence while maintaining appropriate control. Curie's parents set clear boundaries and rules, which established clear limits for exploration. They also tolerated a certain amount of disorder, which reinforced Curie's exploration and developing independence. Erikson (1963) noted that parents should also permit children to explore and act on their newfound initiative so that they can develop a positive view of themselves. Although the boarders and Bronisława's absence led to reorganisation of their schedules, it does not seem to have had an adverse effect on Curie.

Not only did Curie's parents value education, they were also sensitive to their children's holistic development. They incorporated a healthy variety of activities and free play into their schedules. Free play boosts curiosity and imagination. At the same time, rules and boundaries created a safe and reassuring environment in which Curie was able to explore her newfound initiative. They were also accepting and loving. Curie's father made time for personal interactions like reading bedtime stories, which suggests that he was affectionate. Both parents tolerated noisy games and occasional disorder, allowing Curie and her siblings to be imaginative, to explore, and to take initiative.

In ideal circumstances, children will preserve their sense of initiative while learning to respect the rights and privileges of other family members. When this happens, children accept responsibility for themselves and occasionally for their siblings (Erikson, 1978). While Curie took responsibility for herself and her sister when she read from her sister's book, she also felt guilty. Erikson (1965) noted that during this stage, the superego comes into action, and moral

development occurs. Guilt arises as a method to self-regulate and to limit explorations, therefore determining what is permissible. Even though Curie experienced both initiative and guilt in that instance, guilt did not seem to overshadow initiative. Throughout Curie's life, she was renowned for being creative and taking action (see Stages 5 to 8). When a person establishes a proper balance between initiative and guilt, it results in the incorporation of the virtue, purpose (Erikson, 1978).

The researcher concludes that Curie relatively successfully traversed through Stage 3, resolving the crisis of initiative versus guilt, and gained the virtue, purpose. As the reader will notice in the stages that follow, Curie was determined to be a person of importance and had a strong sense of duty. Throughout her life, she displayed initiative and enterprise. She continued to master new skills and purposefully collaborated with peers and colleagues to realise her goals (Curie, 1923; Emling, 2012; Ogilvie, 2004; Quinn, 1995).

**5.2.1.10 Stage 4: Industry versus inferiority (5–13 years).** At this age, children realise that it is necessary to spread their abilities and efforts across a wider social realm. Therefore, the social modality of this stage is community. Children continuously develop their competencies, interact socially, learn, take responsibility, and endeavour to be self-reliant (Morris et al., 2002). Erikson (1978) proposed that children be proud of the things they make, which leads to the development of a sense of ability and self-efficacy. However, it is not only mastering skills, but also receiving acknowledgment and rewards from others, which plays a role. Learning new skills is intrinsically rewarding and may serve as motivation that feeds the drive for industry. Therefore, if parents and peers adequately praise children for their initiatives and abilities, industry triumphs over inferiority. Children then develop a sense of competence and self-efficacy (Carr & McNulty, 2006; Erikson, 1950).

#### **5.2.1.11 Stage 4 findings.**

**Early education.** Curie's formal schooling began at the Freta Street School where her mother had been headmistress. In Grade 3, her parents enrolled her and Helena in a private school closer to home. The oppressive regime exerted control over the schools, which was for Curie one of the worst parts during her early education (Curie, 1923). Russian officials forced schools to teach the Russian language and mistrusted the children (Ogilvie, 2004). Children knew that a single conversation in Polish or an imprudent word might bring harm to themselves

and their families (Curie, 1923). Curie was clever and spoke perfect Russian. Therefore, teachers often chose her to recite the work and answer the government inspectors' questions. It was a great trial for Curie, who wanted to run away and hide (Curie, 1923; Goldsmith, 2005; Ogilvie, 2004).

Curie's intelligence, abilities, and memory also influenced her classmates. They respected her and often asked for her help (Quinn, 1995). Helena, who was in the same class, remembered how dismayed she was when Curie memorised a German passage between class breaks, which had taken her several hours. On a later occasion, a guest recited a poem that Curie loved, and requested a copy. The guest replied that he would repeat it once more for her to memorise since everyone knew she had an excellent memory, so she did (Quinn, 1995).

Curie's parents valued learning and believed that only modern education could lift them from their deprived circumstances (Curie, 1923). Wladyslaw was an outstanding teacher who showed interest in Curie's schoolwork. Curie added that they also shared a close bond and a love for poetry (Curie, 1923). However, Wladyslaw's high standards were evident. He once harshly corrected a linguistic mistake Józef made and urged him to do his best. Curie's mother was also not reluctant to express love conditionally. She made it clear if they did well in school she would love them more. Bronislawa once told Józef that she "would be very ashamed" if he would be at the bottom of his class (Quinn, 1995, p. 40).

***Death and desolation.*** Curie was seven years old when Zofia died of typhus in January 1875. For months, unable to deal with her sister's death, Curie crept into deserted spaces to hide from friends and family (Curie, 1937; Ogilvie, 2004). Three years later, in May 1878, she lost her mother to tuberculosis. This time Curie carried on with her schoolwork with no sign of grief and remained at the top of her class. She lost herself in books for hours, sometimes days at a time, during which she rarely spoke. According to her siblings, the only way Curie was able to cope, was by screening out the world and focusing obsessively on a subject (Curie, 1937; Goldsmith, 2005; Ogilvie, 2004). It caused Curie to also lash out against her religion. Although Curie's father was an atheist, her mother raised her as a Roman Catholic. Curie renounced Catholicism and became agnostic (Quinn, 1995). She revealed that she would never trust in the benevolence of God again and described these losses as the first and greatest sorrow of her life, which threw her into a "profound depression" (Curie, 1923, p. 78).

***Friendship and rebellion.*** Curie was emotionally struggling. Her father believed that a new challenge would be the best consolation. During the summer of 1878, Curie left a nurturing private school and was sent to a more austere public school. Curie found the public school unbearable. The teachers were hostile to the Polish scholars and treated them as adversaries (Quinn, 1995). It was during this time that Curie befriended Kazia Przyborovska, who became her “chosen sister” (Quinn, 1995, p. 50). Every morning Curie and Kazia rendezvoused and walked to school together. Curie also often visited Kazia at her home after school; this was a relief from her crowded, organised and somber home. Kazia’s friendship also made school bearable for Curie. She eventually acknowledged that she enjoyed, even loved, school (Quinn, 1995). Even so, the political atmosphere provoked anger and resentment, and Curie often wanted to “scratch like a cat” (Goldsmith, 2005, p. 30). However, Curie also found more subtle ways to express her defiance. After the Tsar had died in a bombing, a teacher found Curie and Kazia dancing rebelliously in an empty classroom. As Curie matured, she used humour to disguise her irritation. Curie’s somewhat superior attitude annoyed her teachers. Once a teacher forbade Curie to look down on her, but as Curie was a head taller than her teacher, she replied, “The fact is I can’t do anything else” (Quinn, 1995, p. 51). Helena noted that Curie had a “too well-developed independence” and she knew how to defend her opinions (Quinn, 1995, p. 51).

**5.2.1.12 Stage 4 discussion.** Erikson (1968) noted that learning new skills is intrinsically rewarding and may serve as encouragement of industry. Primary and secondary sources indicated that education played a significant role in Curie’s upbringing. Therefore, learning new skills mainly revolved around schooling. Although learning skills is necessary, receiving acknowledgement and rewards from others also plays a significant role during this stage (Erikson, 1978). At school, teachers admired Curie’s intellectual capabilities, and being the favourite to recite and answer the government officials’ questions, was possibly intrinsically rewarding for Curie. Despite her timidity and nervousness, she was still able to do so. It is possible that in these trials, Curie faced the Stage 2 crisis of autonomy versus shame and doubt again. She may have doubted her abilities and felt somewhat inadequate. However, the encouragement and reward from teachers for accepting and executing these tasks may have gradually reinforced Curie’s developing abilities. Developing skills to execute tasks successfully supported Curie’s emerging industry and helped her to overcome feelings of inferiority.

During this stage, children have a wider social interaction through school, peer groups, and teachers. Children now begin to evaluate themselves in relation to their peers and poses the danger that children may develop a sense of inadequacy and inferiority relative to their peers (Erikson, 1965). Curie's peers admired her intellectual capabilities and requested her help with schoolwork. This possibly contributed to building Curie's self-esteem and encouraged a positive self-evaluation in relation to her peers. Even though Helena was dismayed that it took her longer to memorise the same German passage, she admired Curie's abilities. This admiration from her older sister possibly also contributed to Curie's positive self-evaluation and confidence. At home, the high standards and conditional expression of love perhaps drove Curie to work harder to secure praise from her mother and father. However, the evidence does suggest that they were also loving and encouraging. A combination of good relationships, praise and encouragement inevitably motivated Curie to do her best.

When Curie lost her sister to typhus, she ostensibly regressed to the Stage 1 crisis, trust versus mistrust. Zofia's death may have confirmed for Curie that the world is not always a safe place, which led to mistrust and isolation as a coping mechanism. Curie hid away and isolated herself in order to cope and come to terms with her sister's death. When her mother passed away, it compounded her grief. This time Curie revisited the Stage 2 crisis of autonomy versus shame and doubt. As mentioned earlier, when doubt overcomes autonomy, it often results in overburdening oneself and/or self-consciousness, which results in stubbornness and obsessive behaviours. Curie isolated herself and obsessively immersed herself in her schoolwork. The researcher also considers Curie's renouncement of God as a stubborn act; she refused to believe in the compassion of God again. These behaviours support the notion that Curie revisited the Stage 2 crisis while dealing with these losses.

Curie was able to establish peer relationships and be socially interactive. The loss of her sister and mother, together with the oppressive regime, doubtlessly reinforced the bond between Curie and Kazia. Curie regarded Kazia as her chosen sister, possibly to fill the void Zofia had left. Curie often visited Kazia at her home, which Curie considered as an escape from her overcrowded, ordered and sombre home. Curie and Kazia also shared fear, anger, and resentment towards the Russian officials which led to joint rebellion. While revisiting the Stage 1 and 2 crises, Curie found it difficult to regulate her emotions. However, with the growing development of self-regulation, reinforcement from others, and subtle ways to express her defiance, she gradually overcame mistrust and self-doubt.

The researcher concludes that Curie was able to develop her abilities, interact socially, learn, take responsibility, and strive to be self-reliant. Others adequately rewarded Curie for her initiative and abilities. This approval led to the development of a sense of competence and acceptance, resulting in her industrious strivings overcoming her feelings of inferiority. Curie took pride in her accomplishments and incorporated the virtue, competence (Erikson, 1950). In the stages that follow, it is evident that Curie remained productive and driven when having to complete tasks (Curie, 1923, 1937; Emling, 2012; Quinn, 1995).

### **5.2.2 Adolescence and Early Adulthood (1880–1888)**

**5.2.2.1 Stage 5: Identity versus Role Confusion (13–21 years).** Identity formation is central during Stage 5 and relies on the individual's previous roles during childhood. The main task is to achieve ego identity and avoid role confusion (Erikson, 1963). During this time, adolescents are required to affiliate with a peer group in order to meet the need for belonging. The crux lies in their not sacrificing their individuality and personal goals to gain acceptance. According to Erikson (1959), there is a complex interplay between several social systems that influences identity formation. He suggested that a shared balance exists between a person's self-image (ego) and moral beliefs (ethos), hence, ego identity and group identity (Erikson, 1959). The shared balance links the internal world of individuals with their distinctive past and principles (Greene, Graham & Morano, 2010). Successful resolution of this stage centres on the development of an integrated self-image and a sense of reliability, leading to the integration of the virtue, fidelity (Erikson, 1978).

#### **5.2.2.2 Stage 5 findings.**

***Top of the class.*** Curie often felt pressured and wanted to be the best student in her class. While the sadness over the deaths of her mother and sister prevailed, the fear of the Russian inspectors added to her discomfort. Ogilvie (2004) noted that Curie was “on an emotional roller coaster vacillating between almost frenzied joy and deep depression” (p. 8). In June 1883, 15-year-old Curie graduated with top honours from the school and received a gold medal (Ogilvie, 2004; Steele, 2006). After graduation, without the distraction of schoolwork, Curie became progressively more depressed and withdrawn (Steele, 2006). Curie attributed her depression to the exhaustion of growing up and studying (Curie, 1923).



***A blithe year.*** Curie's worried father thought that time in the countryside with family would be the best remedy for her exhaustion and lingering depression. While visiting her family, Curie wrote to Kazia how carefree life was in the countryside. She described the independence, equality, and freedom she felt. Quinn (1995) proposed that what Curie referred to was not just political, but also a freedom from the seriousness of her life in Warsaw. Curie wrote about dancing, fishing, playing games, walks, and what she called "equally childish things" (Quinn, 1995, p. 55). She also joined a kulig for the first time. A kulig is a centuries-old sleigh festivity and Polish tradition in which horse-drawn sleighs carry celebrators, with flaring torches and jingling bells, travelling from one manor house to the next. A kulig became an expression of defiance and was banned by the Russian government (Quinn, 1995).

***The Flying University.*** After nearly a year in the countryside, Curie returned to Warsaw hoping to continue her studies and to teach (Curie, 1937; Ogilvie, 2004). While Polish universities excluded women, Curie and Bronya assumed that higher education was their right. Their circumstances made it seem unlikely that either would be able to afford studies abroad. However, Polish women were renowned for their patriotic fervour and sense of importance. Quinn (1995) described that during the oppression, the sisters preserved the "grand self-esteem which runs in their blood" (p. 66). Circumstances led Curie to become involved with a secret academy, the Flying University. In defiance of the Russian authorities, the Flying University allowed women and taught a pro-Polish syllabus. To avoid discovery, the students met at night at ever-changing locations. Despite the concealment and struggle, Curie found it academically helpful and enjoyed the social companionship. She described the group as enthusiastic and united in a mutual desire to learn, and their actions were also social and patriotic (Curie, 1923). For another year and a half, Curie divided her time between self-education and private tutoring. In the end, realising the need to save for a proper education, she accepted a position as a governess (Curie, 1923; Quinn, 1995).

***Governess.*** In December 1885, Curie became a governess for a wealthy English Warsaw family. She found them wasteful and stingy and struggled to subdue her increasing aversion to the family, who in return found Curie arrogant. Eventually, Curie could not endure the deteriorating relationship and resigned (Goldsmith, 2005; Quinn, 1995; Steele, 2006). Curie reconsidered her position when Bronya decided to study in Paris. The sisters made a pact. Curie

would continue to work as a governess to help pay for Bronya's studies. In exchange, Bronya would support Curie's studies in Paris two years later.

Curie accepted a position with the Zorawski family in the countryside (Curie, 1923; Ogilvie, 2004). While working for the Zorawski family, Curie had to put in effort to behave as expected of a governess (Curie, 1923). She explained to her cousin, "if only you could see my exemplary conduct ... I go to church every Sunday ... I hardly speak of higher education for women ... in my talk, the decorum suitable to my position" (Quinn, 1995, p. 69). In her free time, she organised a small teaching class for the village children. Curie took a risk; the government forbade this kind of initiative, which carried a sentence of imprisonment or deportation to Siberia (Curie, 1923). Aware that few women succeeded in foreign countries, Curie devoted evenings and early mornings to her studies. Her solitary study was overwhelmed with difficulties. The education she received at school was incomplete and substandard to the bachelor's programme of a French lyceum (Goldsmith, 2005; Quinn, 1995).

***First love.*** Early during her time at the Zorawskis, Curie fell in love with their son, Kazimierz. Curie wrote that some people presumed that she should be happy to be in love, but it did not fit into her plans (Goldsmith, 2005). Nevertheless, their relationship deepened. When Kazimierz revealed his intention to marry Curie, the Zorawskis would not allow their son to marry the impoverished Curie. Facing disinheritance, Kazimierz allegedly ended the relationship (Goldsmith, 2005). Curie was humiliated but remained at her post. Her letters exposed her sombre mood and the recurring depression that overwhelmed and isolated her. Curie wrote that she had "fallen into black melancholy" (Goldsmith, 2005, p. 40). She told her sisters that she experienced a lack of self-worth and felt stupid and underprivileged (Goldsmith, 2005; Quinn, 1995). Curie's father lamented their family's poverty in preventing Curie's marriage, but she insisted that he should not blame himself. She reassured him that she and her siblings "have a good education, a solid cultural background, character which is hardly the worst ... we'll make out all right" (Quinn, 1995, p. 74).

Curie's letter to her father was temperate, reassuring, and hopeful, but in letters to her siblings, the tone shifts. Curie wrote that she suffered enormously and had lost all hope of ever becoming anybody. In her complaining and resentful letters, Curie repeatedly vowed never to love again, or get married. After some time had passed, Curie admitted to Kazia that although

some days were hard, she felt appeased because she got through it with her head held high (Quinn, 1995).

There is little evidence to suggest what exactly happened between Curie and Kazimierz. It seemed that Kazimierz had made and unmade his decision, to choose duty over love, several times (Quinn, 1995). The alleged on-again off-again relationship preoccupied Curie for the entire four years she worked for the Zorawski family. In November 1888, shortly before leaving the Zorawski family, Curie wrote, “the vigour of [her] nature conquers . . . First principle: never to let one’s self be beaten down by persons or by events” (Quinn, 1995, p. 77). Curie became excited about the future, and news of Bronya’s engagement added to her enthusiasm. Curie continued to write about the need for change, movement and life, which sometimes seized her with such force that she wanted to become reckless (Quinn, 1995). Curie was 21 years old when she left the Zorawski family.

**5.2.2.3 Stage 5 discussion.** Early during Stage 5, it is apparent that Curie was simultaneously re-experiencing the Stage 1 and Stage 2 crises. The pressure Curie felt to be the top student, the lingering sadness over the loss of her mother and sister, and the enduring oppression may have contributed to the resurfacing of these crises. Dithering between doubt and autonomy, Curie overloaded herself with work and obsessed about being the best. It appears that Curie used denial as a coping mechanism, which is the complete avoidance of the problem, that may lead to denying that a problem exists at all. Distractions such as excessive overwork, usually maintain denial. This coping mechanism sustained Curie until her graduation, whereafter her mood deteriorated to such an extent that her father felt it necessary to send her to the countryside to spend time with family.

It seems that the carefree year Curie spent in the countryside, filled with traditional Polish activities, not only relieved her depression, but also reinforced her ego identity and group identity. Ego identity formation is exposed to the interaction of the different social systems. Therefore, the primary task is to avoid role confusion and achieve ego identity. Because there is a shared balance between a person’s self-image and moral beliefs, there exists a balance between group identity and ego identity (Erikson, 1965). To meet her need for belonging, another developmental task was for Curie to find a peer group with whom she could associate. The carefree year spent in the countryside with fellow nationals, participation in cultural activities, and later involvement with the Flying University, provided Curie with a peer group with whom

she could associate. Such involvement aided Curie's need for belonging. In associating with a peer group, Erikson added that the crux lies in not sacrificing individuality and personal goals to gain acceptance (Erikson, 1963). Curie's ego identity intertwined with her group identity, mainly due to patriotism and it does not appear that she sacrificed her individuality to remain part of these groups. As noted in Chapter 3, Greene et al. (2010) suggested that a shared balance exists between what links the internal world of individuals and their distinctive past and principles. The researcher also considers the period from top of the class until governess as part of Curie's psychosocial moratorium. This moratorium rendered it socially acceptable for Curie to discover and experiment before settling on a more permanent identity (Erikson, 1963).

It is also important for adolescents to have enough time and social freedom to test different developing identities within a controlled and guiding environment. If this does not happen, ego diffusion may occur. Corey (2005) defines ego diffusion as the inability to settle on a stable and well-founded sense of self. Curie's struggles and deliberate attempts to act as a governess when she started working for the Zorawskis may be an indication of ego diffusion. Curie was sacrificing her beliefs to gain acceptance. Curie's relationship with Kazimierz, her patriotism, and dreams of self-actualisation may also have caused Curie some difficulty in finding her sense of self. It seems that the troubled relationship with Kazimierz caused Curie to face the Stage 2 crisis of autonomy versus shame and doubt, once again. Again, Curie reverted to over-manipulation as a coping mechanism and defence against her feelings of shame and doubt. From her letters, it is clear that Curie struggled to overcome her feelings of sadness. It took Curie nearly four years to liberate herself from the shame and doubt that triggered her depression.

Curie often became defiant during this stage. She was insubordinate to teachers and employers. She rebelliously taught illegal classes to children in the countryside. Her involvement with the Flying University and work at a secret laboratory also indicates boldness. According to Erikson (1970), this defiance indicates negative identity formation or the acceptance of an identity that opposes one encouraged by society. Although the researcher may consider Curie's defiance as negative identity formation, the political climate and her cultural background indicate the opposite. The enduring oppression, her culture, political beliefs, and values have motivated her defiance. In a way, one may assume that Curie has already established a strong sense of self, especially from a cultural point of view.

Stage 5 also relies on the previous roles the individual held during childhood (Erikson, 1963). As seen during the earlier stages, education played an important role in Curie's childhood that now transcended into her adolescence; this persisted for most of her life. The interaction of the different social systems gives rise to many other roles. Ego identity centres on experiencing self-consistency and being at ease with oneself and one's social roles. It is necessary to find a balance between holding together a variety of potential identifications and incorporating an identity (Erikson, 1963). Curie endeavoured to find a balance between several identities. These identities included the roles of subordinate governess, teacher, patriotic Pole, partner, ambitious student, and caring daughter and sister. As an individual starts to incorporate a personality, he or she begins to take part in society while preserving individuality and independence (Erikson, 1963).

For the majority of this stage, Curie seemingly found a balance between these roles. However, Curie appeared to endure some confusion at the end of Stage 5 that endured until the beginning of Stage 6 (see Stage 6, An unclear future). Curie wrestled with a decision between remaining in Poland and leaving for France. She seemingly struggled to balance love and the hopes of marriage, with pursuing her goal to study in Paris and being a loyal, caring sister and daughter. The researcher accepts that Curie had achieved ego identity, since she gave the impression to have found a balance between most of these roles. Curie became increasingly at ease with herself and her social roles and by the end of Stage 5 had established a reasonably strong sense of self. Successful resolution of this stage focuses on the development of an integrated self-image but also a sense of constancy (Erikson, 1950, 1963). It is apparent that these roles stayed constant throughout Curie's life (see Stages 6 to 8).

The researcher concludes that Curie had satisfactorily resolved the crisis between identity and role confusion. The positive resolution led Curie to cultivate a resilient self-image. Quinn (1995) revealed that Curie believed "that there is a transcendent life beyond the personal ... To believe that she was part of something larger than herself, a national cause that commanded pride and action" (p. 84). One could accept from this statement that Curie had a strong sense of pride and duty. Throughout her life, Curie often drew on feelings of pride and responsibility to overcome suffering. She embraced a sense of reliability, leading to the incorporation of the virtue, fidelity (Erikson, 1978). Despite an affair in Curie's later life (see Stage 7, The affair), fidelity is evident throughout her life. Curie stayed loyal and committed to her family, husband, children, and above all, science (Curie, 1923; Emling, 2012; Ogilvie, 2004; Quinn, 1995).

### 5.2.3 Adulthood (1888–1927)

**5.2.3.1 Stage 6: Intimacy versus isolation (21–40 years).** The main psychosocial crisis during Stage 6 is to share oneself with another, in both intimate and social relationships, without losing one's identity (Erikson, 1950, 1963). This stage requires individuals to have developed a stable sense of their identity and requires the favourable resolution of prior crises. Difficulties in this phase typically emerge from failures at previous stages, and a variety of social and contextual forces contribute to the outcome (Erikson, 1978). The satisfactory resolution requires the individual to be able to commit to relationships, resulting in the incorporation of the virtue, love (Erikson, 1978).

#### 5.2.3.2 Stage 6 findings.

*An unclear future.* In 1889, Curie left the Zorawski family and worked for one year for a family on the Baltic coast (Curie, 1923; Quinn, 1995). When she returned to Warsaw, Bronya had completed her degree and invited Curie to Paris. Curie felt reluctant; she had lost the hope of going to Paris and felt obliged to stay with her father. Quinn (1995) noted that several reasons might have contributed to Curie's reluctance to go to Paris. Firstly, Curie dreaded travelling, except to familiar destinations. Secondly, her loyalty to and concern for her family was the basis of her sense of self in the world. Thirdly, Curie began tutoring and studying at the Flying University and found access to a secret laboratory where she began her practical training (Curie, 1923, 1937; Goldsmith, 2005; Quinn, 1995). Lastly, Curie and Kazimierz's relationship was still lingering. However, at the end of the summer of 1891, their relationship ended. Curie was humiliated and declared that she would not be regarded as a "stupid lamb" or a "nullity" and that death was preferable to insult (Quinn, 1995, p. 84).

*Student days.* In November 1891, shortly before turning 24, Curie left for Paris. She registered at the Sorbonne and initially lived with Bronya and her husband, Kazimierz Dłuski. She was a very independent person and passed nearly all her time at the Sorbonne (Quinn, 1995). In 1892, Curie rented a loft closer to the Sorbonne. She sometimes felt lonely living by herself, but her usual mood was calm and satisfied (Curie, 1923).

Curie experienced social, academic, and political freedom, which gave her a sense of liberty and independence. She only befriended students who were serious about their studies and

fellow Polish students who lived in the same area. The Polish friendships held a certain familiarity for Curie and they debated national questions, went for walks, and attended public reunions. However, Curie lacked education and needed to learn proper French. After the first year, Curie relinquished most of these relationships to concentrate on her studies. She remained in contact with Kazia and Jadwiga Dydyńska, a fellow classmate and friend (Curie, 1923; Quinn, 1995).

Curie studied during the day and tutored at night. She wrote to Józef that she was working “a thousand times” harder than at the beginning of her stay and became so fixated on her studies that she often forgot to eat (Quinn, 1995, p. 90). Curie struggled financially and had to survive on limited resources. She suffered through cold winters and occasionally fainted from hunger (Goldsmith, 2005; Ogilvie, 2004). Despite the struggles, Curie recalled this time as “one of the best memories” of her life (Curie, 1923, p. 70).

Curie had at least one suitor during this time. A few letters endure as proof of a possible romantic relationship with Monsieur Lamotte. In a farewell letter, he insisted that he would not forget Curie and that he would have done anything for her (Quinn, 1995). After Curie’s engagement to Pierre (see next section, Curie and Pierre), she wrote a final letter to Lamotte, requesting his friendship. Unable to accept mere friendship, Lamotte replied they should “consider each other dead” (Quinn, 1995, p. 124).

In 1893, Curie graduated in physics at the Sorbonne. She was ranked first and was one of only two women in her class. She began part-time work for an industrial laboratory, studying the magnetic properties of various steels (Quinn, 1995). In 1894, with the aid of a fellowship, Curie completed a second degree in mathematics. This time Curie was ranked second and was one of only five women in her class (Curie, 1937; Goldsmith, 2005; Ogilvie, 2004).

***Curie and Pierre.*** Some literature portrays Curie as cold and distant, seemingly to strengthen an image deemed appropriate for a woman in science (Fisher, 1994; Steinke & Xavier, 1987). This portrayal led some authors to suppose that romance had no real place in Curie’s life and they focused exclusively on her hardships, science, and accomplishments. In contrast, some journalists romanticised her relationship with Pierre (Pasachoff, 1996). The researcher found Curie’s autobiographical notes (as found in Curie, 1923) and the biography by Quinn (1995) the most revealing and accurate of the sources consulted.

A colleague, who thought Pierre Curie could supply Curie with laboratory space for her magnetism research, introduced them in the spring of 1894. Pierre was the Laboratory Chief at the Paris Municipal School of Industrial Physics and Chemistry. Although he lacked laboratory facilities, he found space for Curie to conduct her research (Goldsmith, 2005). Shared opinions and their preoccupation with science brought them closer together, and they fell in love.

After a few months of courtship, Pierre proposed marriage. Curie did not accept his proposal immediately. She hesitated before a decision that meant forsaking her country and family (Curie, 1923). In the summer of 1894, Curie returned to Warsaw without giving Pierre any indication if or when she would return to Paris. They exchanged several letters during this time. However, only Pierre's side of the correspondence survives. He was determined not to lose Curie and professed that he would move to Poland, if needed. In the autumn of 1894, Curie returned to Paris. They announced their engagement the following summer. Curie told friends and family that their friendship had grown more precious, both realising that they could not find better life companions. Curie noted that she and Pierre were so deeply attached to each other, they could not tolerate being apart. Curie and Pierre were married in the town hall in Sceaux on 26 July 1895 (Quinn, 1995).

**Partnership.** In her autobiographical notes, Curie noted that their affection for each other united them so tightly that they spent nearly all of their time together (Curie, 1923). Socially, Curie and Pierre had a few friends. Curie held that there was no place in their life for "worldly relations", and they saw only a few friends, scientists, like themselves (Emling, 2012, p. 24). According to Curie, they allowed themselves no diversions and hardly ever went out. Curie deemed this "quiet living" necessary to achieve their remarkable work (Emling, 2012, p. 24). However, Curie's meticulous expenses ledger revealed regular deductions for cinématographe tickets and a subscription to the Théâtre de l'Oeuvre that featured the latest plays. Curie and Pierre were also avid cyclists, and the ledger gave regular proof of money spent on this hobby. In the summer of 1895, they cycled from one fishing village to the next on the North Sea coastline. The following summer they toured Auvergne. On weekends and shorter holidays, they explored the countryside around Paris (Quinn, 1995).

Throughout their lives, Curie and Pierre took regular and extended summer vacations, which Curie viewed as essential to their health and well-being. Favourite destinations included the Carpathian Mountains, Auvergne, Normandy, and the Brittany coast. Friends and family



often accompanied them during holidays. Their primary social group consisted of the Perrins, the Langevins, the Chavannes, the Borels, and Mr Mouton. Each summer a small group of Sorbonne professors, family, and friends vacationed together at L'Arcouest. The Curies were accepted as regulars at L'Arcouest, and it eventually became a second home for them. The Perrins and Borels also formed part of the L'Arcouest circle. Marguerite Borel described it as the “nucleus of a second family, this one of choice” (Quinn, 1995, p. 265). Another close friend was Hertha Ayrton, a fellow physicist Curie met in 1903 (Quinn, 1995).

The Curies also upheld their familial relationships, especially with her brother-in-law and his family. They also regularly visited Pierre's parents in Sceaux. While the Dluskis were still living in Paris, they frequently dined together. When they could manage their schedules, they visited Curie's father and her siblings in Warsaw (Curie, 1923; Emling, 2012; Goldsmith, 2005; Quinn, 1995).

***Motherhood.*** By the end of June 1897, Curie was seven months pregnant when she submitted her magnetism research results. On 12 September, Curie gave birth to their first daughter, Irène. Curie obsessively began recording all aspects of Irène's development, often before and after feedings (For over 15 years, Curie kept comprehensive diaries noting her daughters' development). Pierre's mother passed away two weeks after Irène's birth, and Pierre's father, Dr Eugène Curie, moved in with them. Curie remained in charge of Irène's care, but found in Dr Curie an ideal babysitter. She also hired a wet nurse and additional help. Confident that Irène was in good hands, Curie continued her research (Curie, 1923; 1937; Quinn, 1995).

***A time of discovery.*** Curie was looking for a research topic for a doctoral degree, a feat no woman had yet achieved. At the time, French physicist, Henri Becquerel, discovered that minerals containing uranium emitted rays. There was limited research done on Becquerel's findings and little literature available, which meant that Curie could begin with experiments immediately (Curie, 1923). With no dedicated laboratory, the school of physics and chemistry where Pierre taught, offered them a shed. Initially, Pierre was doing research on crystals, but his growing interest in Curie's work led him to join her in March 1898 (Quinn, 1995).

After months of labour, they made the discovery of two new elements contained within a compound named pitchblende. They named the first element ‘polonium’ and the second

‘radium’. Curie also coined the term ‘radioactivity’ in the course of their research (Curie, 1923). Other scientists did not trust their announcements without sufficient visible and measurable polonium and radium. To prove their existence, the Curies had to separate the newfound elements from the pitchblende, which was a challenging and meticulous process. It was exhausting work to move the heavy containers, transfer the liquids, and to stir the boiling material in a cast-iron basin for hours at a time (Quinn, 1995). Curie lost nearly 20 pounds, and Pierre was often exhausted and in pain (Pasachoff, 1996). They were unaware of the adverse effects of radiation exposure and continued their work unprotected. The radioactive substances caused superficial burns and problems with their hands (Ogilvie, 2004; Quinn, 1995). Despite the physical difficulties, Curie felt more invigorated than enslaved by the challenges of her research. She described that a “great tranquillity” ruled in the shed and that their preoccupation made it dreamlike (Quinn, 1995, p. 156).

In 1900, an invitation to the International Congress of Physics to present their findings, led to some job offers. Marie accepted a post at the École Normale Supérieure and became the first woman faculty member. Pierre took a position at the Sorbonne (Quinn, 1995). During this time, Marie’s father fell ill. On 14 May 1902, on route to Warsaw, Marie received the news that he had passed away. Once she had returned from the funeral, Curie submerged herself in her work again. Two months later, in July 1902, Curie successfully isolated radium. She completed her dissertation, and in June 1903, the Sorbonne awarded Curie a doctorate (Mould, 1998).

***Loss and regret.*** By the time Curie submitted her dissertation, she was expecting a second child. However, in August of 1903, in the fifth month of her pregnancy, she miscarried. Curie was dismayed by the incident and did not tell anyone except Bronya. She felt inconsolable and responsible for the miscarriage because she had fallen ill and had not taken care of her health. Curie remained ill that summer and most of the autumn. Despite claiming that she was feeling better in late September, her illness lingered on. In November, she had a “sort of grippe” but the doctors told her lungs were clear, but that she was anaemic (Quinn, 1995, p. 185).

***Nobel Prize.*** In December 1903, Curie became the first woman to receive a Nobel Prize (Curie, 1923). The Royal Swedish Academy of Sciences awarded Curie, Pierre and Henri Becquerel the Nobel Prize in Physics. It was in acknowledgement of the “extraordinary services they have rendered by their joint researches on the radiation phenomena discovered by Professor

Henri Becquerel" (Nobelprize.org, 2014b). The Nobel Prize brought fame, and the public became fascinated with the Curies and their "amazing radium" (Quinn, 1995, p. 192). Owing to the publicity, the Academy of Sciences offered Pierre membership and the Sorbonne offered him the Chair in Physics.

**Family first.** Besides reporters, requests, and interviews that kept Curie from her work and research, she became pregnant again in the spring of 1903. Irène continued to get ill with various childhood illnesses, and Curie wanting to prevent another miscarriage, turned her attention towards home (Quinn, 1995). Also because of the eventfulness of the Nobel Prize year, they chose a long vacation in St Rémy. Pierre's brother, his wife and two children joined the Curies. Shortly after their return to Paris, Curie gave birth to Eve on 6 December 1904 (Curie, 1923). Curie hired a wet nurse from the start and began keeping the same meticulous record of Eve's development (Quinn, 1995). Financially, the prize money made it unnecessary for Curie to continue work, but she enjoyed teaching and did not want to give up her research. Although Curie felt overwhelmed by her demanding life, Dr Curie gladly helped with the children, together with their nanny, a house cleaner, a wet nurse, and the occasional cook (Quinn, 1995).

**Tragedy.** On 19 April 1906, an accident took Pierre's life. A horse-drawn carriage struck him while he was crossing the road in heavy rain. Pierre fell under its wheels and fractured his skull (Quinn, 1995). Curie kept a mourning journal, in which she gave detailed accounts of her thoughts during the year that followed Pierre's death. Curie began the journal on 30 April 1906, eleven days after the accident. The first inscription read, "Dear Pierre, who I will never more [*sic*]. I never thought I would have to live without you" (Quinn, 1995, p. 232). The subsequent entries indicate that Curie was distressed by a quarrel they had had shortly before his death. Pierre requested Curie's presence at the laboratory, while she felt more needed at home. Curie was troubled that the last words she had spoken to him had not been not loving (Quinn, 1995). For the first month after Pierre's death, Curie sought out her family for support (Curie, 1923).

While grieving for her loss, the Sorbonne faculty had a problem with the Chair created for Pierre. The Sorbonne had never before appointed a woman to teach, let alone hold a Chair. On 3 May 1906 a compromise was proposed. The Chair would remain vacant, and they named Curie the *chargé de cours* and director of the laboratory. The appointment meant resuming

Pierre's duties without assuming his Chair. Friends and colleagues encouraged Curie to accept, and a month after the accident Curie went back to work. She became the first woman in history to teach at the Sorbonne (Quinn, 1995).

Almost a year after the accident, Curie's depression was still so severe that Pierre's brother urged her to recover and continue despite everything (Quinn, 1995). The last entry in the mourning journal was on the anniversary of Pierre's death. Curie wrote that she lived only for the children and his father, "How sweet it would be to go to sleep and not wake up. How young my dear ones are. How tired I feel" (Quinn, 1995, p. 246). Years later Curie acknowledged that the day she lost Pierre, she lost with him, all hope and support for the remainder of her life (Curie, 1923, p. 94).

**5.2.3.3 Stage 6 discussion.** At the beginning of Stage 6, it was difficult for Curie to decide between pursuing a career in science in Paris or staying in Poland with her family and Kazimierz. This difficult decision may have been due to Curie revisiting the Stage 2 crisis. Once again, it seemed that Curie was wavering between holding on and letting go (Erikson, 1968). Curie had to decide if she would attempt to endure the loss of self-control that came with travelling to an unfamiliar destination and an uncertain future.

According to Erikson (1965), Stage 6 is reliant on the development of ego identity during Stage 5. Similar to how Stage 1 lays a foundation for trust and connectedness, so does Stage 5 create a basis for independence and individuality. This preparation enables a person to develop a new level of connectedness and trust (Watson, 2002). Although there is little information on Curie's intimacy with Kazimierz, it laid a foundation for later relationships. This relationship revealed that she was able to risk exposing herself to another person. When the relationship ended, Curie's hurt and embarrassment may have led to isolation or self-absorption (Erikson, 1965). It results from the inability to tolerate the fear of ego loss that arises from self-abandonment. However, Curie's refusal to let others regard her as a senseless nobody was an indication of her developed sense of self and individuality. In the end, Curie seemingly resolved this crisis and regained a sense of benevolence and pride with her decision to go to Paris.

During her student days, Curie's assured self-definition and individuality became more noticeable. Her diaries and letters often revealed the sense of freedom, independence, and satisfaction she felt while living alone and being accountable for herself. Even while she endured hardships, she treasured the feeling of liberty and independence it gave her (Curie,

1923). Curie was also able to establish social relationships with others. Her individuality was visible when she only pursued friendships that shared her beliefs and goals. Later when she made the decision to invest more time in her studies, Curie refused to sacrifice her goals for the sake of belonging to a social group. Her decision to focus on her studies, and limit social and romantic interaction during the first years at the Sorbonne, may also have been due to distantiation. According to Erikson (1965), distantiation is the preference to isolate oneself, in order to eliminate those forces and individuals whose essence seems dangerous to one's own. Curie may also have found the social relationships and a possible romantic relationship with Lamotte as threatening to her essence. Curie never mentioned a relationship with Lamotte in her writings and few other sources note it. It is possible that Curie did not regard this relationship as significant. On the other hand, her silence may also indicate that she distanced herself from him, possibly due to feeling uncertain and defenceless. It seems that Curie did, however, feel a sense of loyalty when she notified him of her upcoming nuptials.

Curie's relationship with and marriage to Pierre still serve as the strongest evidence of her ability to share herself with another, without the fear of losing her sense of self (Erikson, 1968). The findings suggest that Curie and Pierre loved each other deeply. Their shared values and love for science ostensibly strengthened their bond. However, when Curie returned to Warsaw in the summer of 1894, it is possible that she again revisited the Stage 2 crisis. Curie felt torn when she had to decide between a life in Warsaw with her family and a life with Pierre in Paris. In the end, Curie regained her sense of self-control with the decision to join Pierre in Paris. Curie and Pierre were not without their differences. The mourning journal indicated that they occasionally quarrelled. Curie accepted differences of opinion and did not passively follow her husband's views, which indicate that she did not sacrifice her identity for the sake of the relationship.

According to Erikson (1978), love is not only a person's ability to become involved in an intimate relationship with another person, but also to share commitment, procreation, and recreation. Evidence suggests that Curie and Pierre were committed to each other. There were no indications of any extramarital affairs during their marriage. Together they had two daughters, Irène and Eve, and grieved the loss of a third child. Recreationally, the Curies made time for leisurely excursions, holidays, and social activities (Curie, 1923; Quinn, 1995). They had a large social group with shared interests. Further, evidence suggests that Curie endeavoured

to maintain a balance between work and recreation. She deemed vacations and excursions as necessary for not only her daughters' health, but also for Pierre and herself.

Curie maintained close relationships with her family, evident in the volume of correspondence with her father and siblings in Poland. Whenever possible the Curies visited Curie's family and she loved showing Pierre her country. Writings regularly reminisced about dinners and outings with the Dluskis and family reunions and vacations. Curie also had a close relationship with her in-laws, whom they frequently visited or with whom they went on vacations. Curie also opened her home to Pierre's father after his mother passed away (Curie, 1923, 1937; Quinn, 1995).

Erikson (1978) contended that healthy functioning people should be able to be productive at their work without compromising their being loving persons. Curie was able to "love and work", that is, be productive in her research, without compromising being a loving person. In both work and private life, a person learns with whom he or she would like to be (Erikson, 1978). Curie preferred to spend her time with Pierre, in both work and private life. Their joint research presumably strengthened their bond. It was only later, after the birth of Eve, that Curie seemed to feel increasingly torn between work and home. Already before Pierre's death, Curie increasingly began feeling overwhelmed by her responsibilities, regardless of the help she received. Pierre's death once again led Curie to the resurfacing of the Stage 1 and 2 crises. It was difficult for Curie to have hope in the face of this adversity, and for some time she did not believe that she could overcome this challenge of living without Pierre. While facing the Stage 1 crisis, Curie withdrew and isolated herself to cope with Pierre's death. It seemed to have coincided with facing the Stage 2 crisis, where a sense of loss of self-control ultimately led Curie obsessively to submerge herself in her work for nearly four years (see Stage 7, Misery and submersion).

The researcher concludes that Curie's reasonable resolution of the Stage 5 crisis led her to integrate a moderately resilient sense of self. Therefore, this sense of self and individuality (i.e. ego identity) created a foundation for Curie to develop a deeper level of trust and connectedness during Stage 6. Curie's confident self-definition enabled her to risk vulnerability and mutuality with others. Not only was Curie able to establish social relationships, but also romantic relationships. Her relationships with Kazimierz and Lamotte, together with her marriage to Pierre, and an affair (see Stage 7, The affair) in later life, indicate that Curie became

intimately involved with others. Therefore, Curie reasonably satisfactory traversed through this stage and incorporated the virtue, love (Erikson, 1978).

**5.2.3.4 Stage 7: Generativity versus stagnation (40–60 years).** According to Erikson (1968), generativity is concerned with guiding the next generation. It may comprise of caring for one's children, teaching others, or being involved with the next generation in other ways. Those who become productive focus their energy on making the world a better place for future generations. Erikson (1965) noted the adult has by now hopefully resolved previous life crises, allowing him or her to concentrate on assisting others. The virtue, care, is associated with this stage (Erikson, 1968).

**5.2.3.5 Stage 7 findings.** It is important for the reader to note that a multitude of events overlaps during this stage. Therefore, the researcher divided the findings according to the biographical subheadings while attempting to maintain chronological flow.

***Misery and submersion.*** For the first four years after Pierre's death, Curie was consumed by grief. In 1907, she confessed to Kazia that her life was "upset in a way that will never be right again" (Quinn, 1995, p. 250). At home, her daughters observed her leaden stare, elusively fixed on nothing, silence, and withdrawal that appeared at any time. Curie increasingly spent more time on her research and entrusted the care of her daughters to their grandfather Eugène and their nanny (Quinn, 1995). Curie brought work home and submerged herself in her scientific research. Eve remembered the same sight every night, her mother surrounded by papers, engrossed in a complicated calculation (Quinn, 1995, p. 420). To colleagues, Curie appeared "dead to the world ... A scientist walled in behind her grief" (Quinn, 1995, p. 257). Curie did research; it was "a complete depersonalization and concentration of all her soul on the work" (Quinn, 1995, p. 420). The only way Curie knew how to cope with her grief was through immersing herself in her work.

From 1909 until 1914 Curie undertook several projects and continued to teach at the Sorbonne. Curie's efforts to establish the Radium Institute began in 1909. During this period, she isolated radium and defined an international standard for radioactive emissions: the curie. She published a book and served as a member of several societies (see Appendices B and D). In 1911, despite her undertakings and accomplishments, the Academy of Sciences rejected Curie's application to fill the Physics Chair because she was female. After the Academy's rejection and

amid the affair (see subsequent sections, The affair, and Disgrace and honour), Curie's health deteriorated, forcing her to take nearly a year off from work. By the end of 1912, Curie returned to work and focused on the construction of the Radium Institute. The Radium Institute was completed in 1914. Here scientists conducted research in chemistry, physics, and medicine until the war broke out (Curie, 1923, 1937; Ogilvie, 2004; Quinn, 1995).

***Convictions about education.*** According to Quinn (1995), Curie mainly continued for the sake of Pierre's ideals and their shared scientific dreams. Both Curie and Pierre held strong convictions regarding their daughters' education. Although Curie submerged herself in her research, she remained mindful of these previously shared beliefs about her daughters' education. Curie and Pierre both disliked teaching programmes that did not allow enough leisure time and exercise. In 1906, Curie arranged a home-schooling trial, which lasted until 1908. It involved the children of other Sorbonne professors, who also cooperatively did the teaching (Curie, 1923; Ogilvie, 2004; Quinn, 1995). At home, Curie enforced a balanced routine that included physical activities, leisure time, and education. After grandfather Eugène's death in 1910, Curie hired a series of Polish governesses to care for and teach her daughters Polish (Curie, 1937; Quinn, 1995). Curie's belief in exercise and healthy surroundings extended to the Sorbonne's students. When the Sorbonne planned to build a sports park for men only, Curie met with the Rector and questioned why females could not enjoy the same consideration (Quinn, 1995). When reporters asked Curie for her opinion on surmenage, overwork among students, Curie replied that it "does not correspond to the normal conditions of physical and intellectual development" (Quinn, 1995, p. 420). Curie explained that she did not approve of a system that kept students in school from early morning until late afternoon and which required them to study every night until late, taxing their eyes and depriving them of sleep. Even at the laboratory, Curie encouraged the workers to go outside, "to breathe, to take the air, to eat something" (Quinn, 1995, p. 404). She also took great care of the gardens at the Institute, because she wanted them to be a sanctuary the workers could enjoy during breaks (Quinn, 1995).

***The affair.*** In mid-July 1910, Curie and Paul Langevin became lovers (Quinn, 1995). Paul was a colleague and close friend of the Curies. Paul's wife, Jeanne, found love letters Curie and Paul exchanged and leaked the affair to the press. When Curie returned from the annual Solvay conference in Belgium in 1911, she found an angry mob in front of her home. She was



forced to take refuge with her two daughters at a friend's house (Goldsmith, 2005). Jeanne charged Paul with "consorting with a concubine in the marital dwelling", a charge that would be heard in a criminal court (Quinn, 1995, p. 313). Meanwhile, Curie and Paul deliberated divorce proceedings and the custody of his children (Quinn, 1995). These discussions reveal that their relationship went beyond a mere affair, and that they were planning a life together. However, matters escalated when Gustave Téry, founder, editor, and principal writer for *l'Oeuvre*, printed the letters. It turned into a xenophobic attack on Curie and the media labelled her as the "foreign woman" who was destroying a "French home" (Quinn, 1995, p. 317). The scandal died down, but Téry persisted. He announced that Curie's middle name was Salomé, insinuating that she was a Jew. In the end, Paul and Jeanne reached a separation agreement, and the case never went to trial. Aside from a public statement and the letters, there is no document in Curie's words about the affair that reveals her private thoughts and feelings. It seems that Curie accepted that a life with Paul was no longer possible; they remained friends (Quinn, 1995).

***Disgrace and honour.*** Amid the affair, in November 1911, the Royal Swedish Academy of Sciences honoured Curie again, this time with the Nobel Prize in Chemistry. It was in acknowledgment of Curie's "services to the advancement of chemistry by the discovery of the elements radium and polonium, by the isolation of radium and the study of the nature and compounds of this remarkable element" (Pasachoff, 1996). However, a friend and associate of the Academy of Sciences dissuaded Curie from accepting the Nobel Prize until the trial had cleared her name. He believed that if the letters were authentic, the Academy would probably not have awarded her the prize until she had given an explanation that the letters were fabricated (Quinn, 1995). Curie replied directly to the Academy, stating that the prize was for the discovery of radium and polonium and that there was no connection between her research and private life (Quinn, 1995). Curie's acceptance speech at the Nobel ceremony in Stockholm made it clear that isolating radium was done by her alone (Quinn, 1995). Several paragraphs of her acceptance speech began with the personal 'I': "I determined ... I thus obtained ... I was struck ... I measured ... I then thought ... I further thought," which was supposedly to ensure that nobody could claim that Curie "was a mere appendage to gifted men" (Quinn, 1995, p. 330).

***Illness and recovery.*** From November 1911 Curie began to struggle with physical illness and depression. Her state continued to worsen until she was rushed to the hospital in December

1911, where doctors diagnosed her with a kidney infection. In March 1912 Curie was back in the hospital for surgery. Curie struggled to recover fully and took time off from the Sorbonne to travel from one retreat to another in search of a cure. She applied the same meticulous, scientific methods to the task of overcoming her illness. Every morning and evening, Curie measured and charted the amount of water she drank, and the amount of urine discharged. She kept track of signs of infection and her temperature (Quinn, 1995). By the end of 1912, Curie felt well enough to return to Paris, and continue her research and overseeing the completion of the Radium Institute until the war broke out.

***War and aftermath.*** In August 1914, Germany invaded France, and scientific research came to a halt. Curie believed it was up to each person to take his or her initiative to serve France during the war. Curie donated to national support, soldiers, shelters, the poor, and other causes. She also took the income from the second Nobel Prize and invested it in French war bonds. When she tried to contribute her medals, the bank refused to melt them down (Curie, 1937; Goldsmith, 2005; Quinn, 1995). Curie then decided to use her scientific knowledge to aid the war (Curie, 1923). She set up radiology units in hospitals, commissioning the unused equipment in laboratories (Quinn, 1995). She realised that X-rays could help save the lives of wounded soldiers and that mobile units were needed to assist the doctors on the front line. She developed 20 mobile X-ray units, known as petite Curies, and 200 immobile posts (Curie, 1937). Irène began assisting her mother, and together they helped over one million wounded soldiers with the X-ray units. They also prepared radon vials for the treatment of septic wounds, which led to a new school for female X-ray technicians. Curie personally trained these women. The opening of the school led to a permanent unit for radium therapy at the Radium Institute, especially for cancer treatment (Emling, 2012; Ogilvie, 2004; Quinn, 1995).

After the war ended in 1918, Curie did not receive any formal acknowledgment from the French government for her assistance (Goldsmith, 2005). Nonetheless, Curie's experience in war radiology gave her extensive knowledge that she felt should become public. She wrote a book *Radiology and the war*, in which she noted that the benefits of X-rays during the war were proof that science would continue to help humanity in unexpected ways (Curie, 1923). Curie believed that educated people had a duty to guard pure science and support scientists; that it was the only way a nation could evolve to reach an ideal (Quinn, 1995, p. 377).

***Social action.*** In 1919, Curie was asked to sign a declaration for a movement named Clarté, which called on all intellectuals of the world to unite against war. Curie declined and explained that the Clarté did not require those who belonged to it to agree on defined basic principles of international and social justice. For useful communal action, people needed to agree on precise actions for particular problems. Although Curie did not sign the Clarté declaration, she noted that she had “not entirely figured out the form of participation in social action” she would take (Quinn, 1995, p. 380). Then, in 1922, a newspaper article declared that Curie had founded an organisation, the Commission on Intellectual Cooperation of the League of Nations. Although false, Curie chose to support it none the less, and served as vice-president for some time. Curie served on the commission for over 12 years, during which she established an international bibliography of scientific publications, developed guidelines for international scholarships in science, and attempted to write rules for protecting scientists’ claims to discoveries (Quinn, 1995).

***United States of America.*** After the war, Curie lacked funding. She feared that she would be unable to realise her dreams for the Radium Institute, to serve “the highest interest of humanity” (Curie, 1923, p. 110). She refused to publicise the need for funding. However, an opportunity arose when she met Missy Meloney, editor of the *Delineator* magazine. It was soon after the United States declared woman free to vote in 1920 that Missy went Paris to interview Curie. Because of the need for funding, Curie accepted Missy’s resourcefulness. Missy arranged a campaign to raise money to buy Curie, “The Greatest Woman in the World,” one gram of radium as a gift from American women (Curie, 1923; Emling, 2012; Quinn, 1995). In 1921, Curie travelled to the USA to receive the radium from President Harding. Despite Curie’s fear of public speaking, she allowed herself “to be held up by those in America struggling for women’s liberation as living proof that women were every bit as smart and capable as men” (Emling, 2012, p. 45). During her acceptance speech, Curie held that research must be conducted for itself, “for the beauty of science, and then there is always the chance that a scientific discovery may become like radium, a benefit for humanity” (Emling, 2012, p. 51). Curie’s visit spanned several weeks and included various universities, women’s colleges, research facilities, and laboratories across the USA. According to the New York Times, Curie’s visit to Carnegie Hall was the largest meeting an American women’s college ever held. Although it was not Curie’s objective to promote women's rights, she inspired women to raise

the threshold for entering science (Quinn, 1995). Curie returned to France with the one gram of radium, so severely radioactive it could fuel countless experiments, provide money for high-priced equipment, and maintain the Radium Institute (Lewicki, 2002).

***Continued work and activism.*** After returning from the USA, Curie understood just how important she could be (Quinn, 1995). Curie became more motivated by personal interactions, and she accepted the burden of overseas trips, public ceremonies, and social engagements (Emling, 2012). Curie remained dedicated to the Radium Institute where she readily accepted female and foreign researchers (Quinn, 1995). Among these researchers were Marcel Guillot, who described Curie as gentle and kind, with an almost maternal concern for everyone (Quinn, 1995). Hélène Emmanuel-Zavizziano was surprised that Curie took time for “a beginner like herself” (Quinn, 1995, p. 404). Moise Haissinsky described Curie as a marvel who “inspired, administered, and led” and simultaneously allowed young scientists to be creative and free to choose their topics and methods (Quinn, 1995, p. 405).

As the 1920s progressed, the Institute became the locus of power in French science. Although the laboratory expanded as its wealth and radioactive resources grew, funding remained problematic for everything Curie wanted to accomplish. She acknowledged that she had sacrificed a fortune by not patenting her discoveries, but believed it was the right thing to do (Curie, 1923). Curie, who had always avoided material profit for herself, became the champion for scientists and continued her efforts to establish a copyright for scientists. She believed that this copyright would serve as a reward for the disinterested work that serves as a foundation for industrial applications (Emling, 2012). Curie also pioneered scientific exchange programmes for young scientists. She was obsessed with the notion that intellectual gifts were lost among the poorer classes and took it upon herself to develop international scientific scholarships that allowed struggling, but capable individuals, to uncover and cultivate their innate abilities (Emling, 2012). Curie continued to seek ways to assist and guide the next generation. In 1922, she became a member of the French Academy of Medicine and travelled to foreign countries where she made public appearances and lectured (Pasachoff, 1996). In 1925, Curie visited Poland to participate in a ceremony that laid the foundations of the Radium Institute in Warsaw (Ogilvie, 2004).

**5.2.3.6 Stage 7 discussion.** Early during Stage 7, Curie struggled to adapt to life without Pierre. Curie lost hope that life would ever be good again. As previously discussed in the Stage

6 findings, it is apparent that Curie revisited the Stage 1 and 2 crises. The enduring pattern of hopelessness and depression, initiated by grief that led to isolation and submersion in her work, once again ensued. Potentially, it was perhaps this isolation and submersion in her work that drove Curie's creativity and productivity. The researcher regards the period after Pierre's death, when she mainly focussed on their shared ideals and scientific dreams, as self-absorption. According to Erikson (1978) is selfish living intertwined with detachment or stagnation. Although Curie detached herself from others, she never stagnated in her work; instead, she remained productive while fighting for her reputation as a scientist.

For Erikson (1968), generativity is primarily concerned with establishing and guiding the next generation. Initially, Curie's endeavours to fund and guide the next generation were mostly evident in ways to educate and care for others. Despite distancing herself, she remained concerned about her daughters' upbringing and education. However, Erikson (1978) noted that generative people feel an obligation not only to their children, but to the wider community as well. Involving other parents/teachers with her teaching programme was a generative act. Curie was also a caring person who considered and encouraged the wellbeing of others. This was evident in Curie's actions when she advocated for the unbiased delivery of sport and recreation facilities at the Sorbonne. She also publically voiced her opinion on *surmenage* and continuously encouraged the workers at the laboratory to take care of themselves through taking regular breaks.

During Stage 7, people also begin to adjust to the incongruity between their ideals and actual achievements (Erikson, 1978). If an individual fails to realise a sense of productivity and generativity, it may lead to psychological stagnation. Erikson (1978) posited that various distractions may disguise stagnation, for example, infidelity. Curie's affair with Paul Langevin may have been such a disguise. However, because Curie did not stagnate in her productivity and generativity, the researcher concludes that the affair was not a disguise for psychological stagnation of Stage 7, rather, a facade for psychological stagnation that related to the resurfacing of the Stage 1 and 2 crises. Curie seemingly felt despondent and unable to resolve difficult challenges. In addition, she lost the hope to trust or love another person again. It is evident from Curie's letters that she did not regard this relationship as a mere affair, but had hoped to establish a life with Paul. Curie gradually placed her confidence in Paul, with whom she saw a future.

When the Academy honoured Curie with a second Nobel Prize amid the affair, she regained a sense of autonomy when she responded that there was no link between her private life

and her research. Her acceptance speech clearly indicated her sense of independence. Although Curie seemingly overcame shame and doubt when accepting the Prize, it did not last. Curie's depression and shame after the failed relationship, together with her declining physical health due to radiation exposure, led her obsessively to seek a cure for her ailments. The obsessive-compulsive behaviour presented in 'illness and recovery' signifies the reappearing of the Stage 2 crisis. Curie suffered feelings of shame and doubt, felt self-conscious, and experienced a lack of self-control. Curie apparently resolved the recurring Stage 2 crisis to a degree by the end of 1912.

While the war elicited more of Curie's creativity and generativity, it was also a turning point when she realised how much her science could contribute to humanity. Evidence suggests that Curie felt a renewed sense of purpose. Her thoughtful and selfless endeavours to use her knowledge and assemble equipment were creative acts. Curie's creativity and generativity not only aided and saved thousands of soldiers, but also led to the establishment of a teaching school and cancer treatment unit. Curie's generativity were also visible when she wrote a book to ensure that her knowledge could become public so that others could benefit from it. After the war, although Curie decisively refused to sign the Clarté declaration, it was obvious that she wanted to participate in some form of social action. Besides her engagements while serving The League of Nations, Curie increasingly became involved in actions to establish support for the next generation of scientists and social conventions to aid underprivileged but talented students. Her generativity and attention to future generations continued to grow.

Curie's dream for a Radium Institute may have sprung from her and Pierre's own struggles during the beginning of their research. However, Curie's initial self-centred intentions regarding the Institute gradually turned out to be generous and aimed to serve humanity. It was evident that her trip to the USA was purely to receive the gift of radium she needed for the establishment of the Institute. Curie's goals were not to propagate women's rights, but rather champion scientific research. However, the visit revealed to Curie just how influential she could be. It surely sparked even more generativity as she increasingly endured public appearances, which she despised. Curie knew these appearances would create funding and therefore aid underprivileged, female, and foreign researchers. Curie's continued work and activism throughout Stage 7 demonstrated her creativity and growing generativity.

The researcher concludes that Curie had successfully and timeously resolved the crisis of generativity versus stagnation. This successful resolution led Curie to incorporate the virtue,

care (Erikson, 1978). Curie was portrayed as generous to a fault. Although she never considered herself an activist for feminism or racial intolerance, she cared for women and foreigners and endeavoured to assist them in any way possible. In the end, there was little discrepancy between Curie's dreams and her actual achievements. Despite financial struggles and her declining health, Curie endeavoured to stay productive and propagative. Neither was Curie selfish with her knowledge and accomplishments. Erikson (1965) held that without commitment and focus, a person would mainly live for himself and his or her pleasure, without any regard to the next generation or the greater good. Evidence indicates that by the end of Stage 7, Curie did not live a self-centred life. She had been concerned about the next generation, and what would be best for humankind.

#### **5.2.4 Final Years (1927–1934)**

**5.2.4.1 Stage 8: Integrity versus despair (60 years until death).** Erikson described integrity as the acceptance of one's one and only life cycle, and the people who have become significant to it. Those who can accept the events that formed their lives, achieve integrity. They can integrate failures, disappointments, conflicts and their growing incapability and frailty. These individuals can face death without fear (Carr & McNulty, 2006; Erikson, 1978). Wisdom is the ego strength that flows from a successful resolution of this stage. Sadock et al. (2007) noted that individuals who fail to accomplish integrity might become repulsed by the world and condescending of people and institutions. A sense of despair might set in for these individuals (Erikson, 1978).

##### **5.2.4.2 Stage 8 findings.**

**Heritage.** Although Curie was never materialistic, she bought two properties, one in L'Arcouest and one in Cavalaire-sur-Mer on the Mediterranean coast. Curie wanted her daughters to be secure and placed a house in each of their names. Curie also remained preoccupied with the establishment of a Radium Institute in Warsaw, wanting to leave something behind for her beloved native country. In 1929, Curie wrote to Missy that she still needed "several years of efficient work to take care of the Institution ... and to make it safe for the future" (Quinn, 1995, p. 418). Curie feared her strength would fail her before its completion. In 1929, with Missy's help, Curie travelled a second time to America to receive a grant from President Hoover. During her acceptance speech, Curie declared that scientific research "has its

great beauty and its reward in itself” and the bonus was the added satisfaction of seeing that her science could be used to relieve human suffering (Emling, 2012).

**Persistence.** Curie continued to do some research, but her focus shifted to the management of the Radium Institute in Paris, which she transformed into a world centre for research. Owing to the support from America, Curie also had the funding for the establishment of the Radium Institute in Warsaw, which she continued to oversee. In 1930, Curie also began serving as a member of the International Atomic Weights Committee and was appointed to oversee the reorganisation of the League of Nations International Committee (Emling, 2012; Goldsmith, 2005). Curie showed no inclination to settle down. In 1932, when the Radium Institute in Warsaw finally opened, she started to write a book on radioactivity and continued to give lectures at the Sorbonne.

**Physical decline.** Throughout her life Curie struggled with cataracts and declining health. Already during her visit to the United States in 1921, Curie had become so exhausted that she had to shorten and cancel appointments. The press reported all kinds of explanations, but the main source of her illness, which included drop in blood pressure, dizziness and anaemia, was the prolonged exposure to radioactivity (Goldsmith, 2005; Quinn, 1995). Curie fell ill more frequently and increasingly, and felt regretful that none of her siblings were close by (Emling, 2012). In 1932 Curie wrote to Bronya, “there are three of you in Warsaw, and thus, you can have some company and some protection ... family solidarity is after all the only good thing. I have been deprived of it, so I know” (Emling, 2012, p. 121).

In December 1933, X-rays revealed a large gallstone, but Curie refused an operation since her father had died from complications following a similar procedure. The thought of dying weighed heavily on Curie. Her concern prompted her to write to Missy in early 1934 to ensure there were no legal loopholes in the agreement regarding the disposition of radium given to her by the women of America. She increasingly handed over many of her responsibilities at the laboratory to Irène and her husband, Frédéric Joliot-Curie. Curie visited Poland for the last time in early 1934 and after that joined the Joliot-Curies on a trip to the Savoy Mountains. During Easter, Curie took a trip with Bronya to the house in Cavalaire, where they stayed for several weeks. It was during this trip that Curie uncharacteristically wept in Bronya’s arms, confessing that her declining health troubled her. Curie feared that she might not be able to



finish her book on radioactivity and wanted to build a new house in Sceaux (Emling, 2012, Quinn, 1995).

***Final days and legacy.*** In April 1934, doctors warned Curie that she needed to rest, but she ignored their advice and insisted on going back to work at the Institute and proofreading her book. In May, she fell so severely ill that her daughters had to take her to a clinic, after which doctors recommended she go to a sanatorium in the Savoy Mountains. Her daughters were determined to protect Curie from knowing that she was dying, and therefore did not call the family to her bedside. Eve also put a stop to any treatment that would prolong her pain (Emling, 2012). Curie remained at the sanatorium until her death on 4 July 1934. She died of aplastic anaemia, a blood disease caused by excessive exposure to radiation. She was buried beside Pierre at the cemetery in Sceaux (Emling, 2012; Ogilvie, 2004).

Albert Einstein published a memoir in the year after her death, in which he credited her discoveries to both insight and persistence under the most tiresome circumstances imaginable. He concluded that of all famous people, she was the only one whom fame had not corrupted (Ogilvie, 2004). Curie's book, *Radioactivity*, was published posthumously in 1935 (Pasachoff, 1996). In 1995, the remains of both Curie and Pierre were relocated to the Panthéon in Paris, in honour of their achievements (*New York Times*, 1995). Curie became the first, and to date, the only woman honoured with entombment in the Panthéon on her own merits. In the end, Curie's scientific achievements became the standard for what a woman could achieve in science (Pasachoff, 1996).

**5.2.4.3 Stage 8 discussion.** The primary task for a person during Stage 8 is to master and adjust to the changes in one's opportunities, and ultimately to develop a final identity for oneself, which includes what one is like in old age. Productive people will be able to integrate all aspects of their identities and feel satisfied with the life they had (Watson, 2002). They would feel accomplished, and that they are leaving something good behind for others (Erikson, 1978). During the first part of Stage 8, Curie displayed a sense of achievement in her work as a scientist and was satisfied that she was leaving 'something good' for others. She felt content that her science could relieve human suffering. Not only did Curie care about her legacy as a researcher, but she also wanted to ensure that her daughters were cared for. Her persistence was evident in her continued involvement at the Institute and on various committees. Curie independently continued her work but also became increasingly more family orientated and desired family

solidarity. Erikson (1978) held that being independent and connected to others were two opposing needs of life, which a person could now finally integrate, to gain integrity.

However, satisfactory resolution of this stage requires that the individual has developed all the beforementioned ego qualities and resolved the associated developmental crises to some extent (Erikson, 1965). When a person possesses a sense of integrity and wisdom, he or she can tolerate the closeness of death while having a disconnected but active concern with life (Erikson, 1978). Data revealed that Curie was gradually detaching herself from her duties and handed responsibilities over to others. She also began spending more time with family and friends. However, this stage requires a person to accept the certainty of death and know that one's choices and options for different life courses are essentially over (Erikson, 1978). Curie could not tolerate the closeness of death with her rapidly declining health. Once again, it appears that Curie regressed to the Stage 2 crisis, causing her to resort to stubbornness and obsessiveness to cope. Curie wilfully refused an operation and after a period of rest obsessively continued with her work. Finally, on her deathbed, her daughters took precautions to safeguard Curie from the reality of her impending death or to prolong any further suffering.

The researcher concludes that Curie only partly resolved the Stage 8 crisis. Curie did integrate most aspects of her identity. She had a sense of achievement and knew that she was leaving behind something good for generations to come. Curie was also able to integrate the two conflicting needs of being independent and connected to others. However, she had not yet fully disconnected from her intense concerns with life, and what she still wanted to accomplish. Because Curie was unable to tolerate the closeness of death, she only partially managed to incorporate a sense of integrity and the virtue, wisdom.

### **5.3 Chapter Summary**

In this chapter, the researcher described Curie's psychological development in terms of Erik Erikson's (1965, 1978) psychosocial developmental stages. In doing so, the researcher also hoped to illustrate her mortality, diligence, determination, and love for science. Marie Curie was an intricate individual and an ingenious creative scientist. The world still remembers her for her passion and eminent scientific research. Her undertakings played an important role in changing education for women, and encouraged female scientists to take a seat in a androcentric world.

Domestic circumstances and parental strictness ostensibly affected Curie's psychological development during her first three years of life. Curie's inability to incorporate adequate trust

during Stage 1 was noticeable in recurring periods of withdrawal, depression and isolation when facing trials throughout her life. In addition, the unsuccessful resolution of Stage 2 is also evident during the course of her life, as seen in her inflexibility, perfectionistic, and obsessive-compulsive personality traits. Although regarded as negative, Curie succeeded in utilising these traits to achieve her success. One may wonder if she would have accomplished so much without these traits. Curie traversed relatively successfully throughout the later stages of her psychosocial development, which led her to incorporate the virtues of purpose, competence, fidelity, love, care, and a reasonable amount of wisdom. However, in the end, Curie's failure to resolve the Stage 2 crisis, which led to conflicting tendencies between holding on and letting go of life, hampered her from developing a sense of integrity and the virtue, wisdom, fully.

## CHAPTER 6

### CONCLUSIONS, LIMITATIONS, VALUE, AND RECOMMENDATIONS

#### 6.1 Chapter Preview

The final chapter concludes this psychobiographical study of Marie Curie. The researcher revisits the aims of the study and provides a summary of the research findings. Thereafter the limitations and value of the study are discussed as it pertains to (a) psychosocial personality development as proposed by Erikson (1950, 1978), (b) psychobiographical case study research, and (c) Marie Curie as psychobiographical subject. Finally, the researcher provides recommendations for future research.

#### 6.2 The Aims of the Study Revisited

The primary aim of this psychobiographical study was to explore and describe Marie Curie's life with the objective to uncover and reconstruct it psychologically (Fouché & Van Niekerk, 2010). The researcher used Erikson's (1959) theory of psychosocial personality development as a theoretical frame to describe Curie's development throughout the course of her life. A secondary aim of this study was to examine the applicability and appropriateness of Erikson's (1950, 1975) theory to Curie's personality development. The descriptive-dialogic nature (Berg, 2001) of the study was used to investigate the credibility of the theoretical propositions and conceptualisations of Erikson's (1950, 1975) theory. The tertiary aim of this study was to contribute towards the current psychobiographical studies done in South Africa. Fouché and Van Niekerk (2010) deemed it necessary to encourage psychobiographical research, not only in South Africa, but also across Africa. For this reason, the accumulation of research findings could support the establishment of a database that will aid comparative analysis of biographic categories (Ponterotto, 2014).

#### 6.3 Summary of the Research Findings

Erikson's (1959) theory of psychosocial development describes the impact of social experience across individuals' entire life cycles and therefore allowed a holistic picture of Curie's psychosocial development to emerge. One of the main components of Erikson's theory is the development of ego identity, which is the conscious sense of self that individuals develop through social interaction. In addition to ego identity, Erikson also held that a sense of competence motivates individuals' behaviour and actions. Each stage of the theory is concerned

with individuals becoming competent in a specific area of their lives. Therefore, the theory provided a framework to assess the extent to which Curie resolved the developmental crises successfully.

The research findings indicate that Curie handled the first two stages poorly, and emerged with a sense of inadequacy. By the end of the first stage, trust versus mistrust, Curie had failed to develop adequate trust, which resulted in fear and a belief that the world is unpredictable and changeable. Curie's inadequate development of trust caused her to resort to a persistent pattern of withdrawal and depression whenever facing trials and disappointments. However, by the time Curie reached her late adult years, self-regulation, reinforcement from others, and subtle rebellion helped Curie to gradually overcome mistrust and self-doubt.

Curie's unsuccessful resolve of the Stage 2 crisis, autonomy versus shame and doubt, had the life-long consequence of causing her to dither between feelings of security and confidence, on the one hand, and periods of inadequacy and uncertainty about herself, on the other. At times when Curie felt inadequate or doubtful about herself, she displayed ritualised behaviours, prompted by the development of a punishing conscience. Self-consciousness often gave rise to Curie's overburdening herself and resorting to obsessive, stubborn, and obsessive-compulsive behaviours.

Curie successfully resolved the subsequent stages and gained a sense of mastery, which provided her with a specific set of ego strengths or qualities. Curie successfully resolved the Stage 3 crisis, initiative versus guilt. Thus, it allowed Curie to incorporate a sense of ability, enterprise, and the ability to lead others. Through Curie's social interactions during Stage 4, she developed a sense of pride in her accomplishments and abilities. Curie was encouraged and commended by her parents, teachers, and peers, which allowed her to cultivate a feeling of competence and belief in her skills. However, during Stage 4, Curie suffered the loss of her sister and mother. These losses caused the Stage 1 and Stage 2 crises to reappear during this time.

Curie adequately resolved the subsequent Stage 5, identity versus role confusion. During adolescence, Curie explored her independence and developing sense of self. She received proper encouragement and reinforcement through personal exploration. Although Curie wrestled temporarily with uncertainty and confusion about the future at the end of this stage, she still emerged with a strong sense of self and independency.

Stage 6, intimacy versus isolation, covered the period of Curie's early adulthood when individuals explore personal relationships. According to Erikson (1950, 1978) it is vital that individuals develop close, committed relationships with others. Although Curie's failed relationship with Kazimierz during Stage 5 caused her to struggle with a poor sense of self which led to emotional isolation and depression, Curie overcame this disappointment. Curie emerged with a stronger sense of personal identity, which enabled her to establish committed and secure relationships with friends, colleagues, family, and especially her husband. It confirmed that Curie had successfully resolved the Stage 6 crisis and incorporated the virtue love.

During adulthood, individuals continue to build their lives, focusing on their families, careers, and the community. This denotes the Stage 7 crisis, generativity versus stagnation. The death of Curie's husband at the end of Stage 6 instigated a four-year period during which the unresolved Stage 1 and Stage 2 developmental crises resurfaced. Despite being faced with these two crises early on during Stage 7, Curie contributed to the world by remaining active at home, and in her work and community. In the end, Curie's teaching efforts, hard work during the war, social action, and continued work and activism, proves that she was a generative and caring person.

Finally, Stage 8, integrity versus despair, occurred during Curie's old age and focuses on reflecting on and reviewing life. Erikson (1978) noted that individuals who are unsuccessful during this stage could feel that their lives had been wasted and might be regretful. In this case, Curie felt proud of her accomplishments and gained a sense of integrity. Although Curie seemingly had few regrets and a general feeling of satisfaction, she was unable to tolerate the closeness of death. Curie was unable to accept that her life was ending, which left her incapable to fully disconnect from life concerns and all she still wanted to achieve. Therefore, Curie only in part managed to incorporate a sense of integrity.

This study has described and explored Curie's life within a formal psychological theory, while simultaneously examining the theory. In the researcher's view, it has illuminated how Curie's unique personality developed according to Erikson's psychosocial developmental theory, despite her growing up in an oppressed country and having limited resources. Lastly, the study supplements the biographical information available on Curie's life and work.

## **6.4 The Values and Limitations of the Study**

### **6.4.1 The Value of Psychosocial Personality Development**

Erikson's (1959) theory of psychosocial personality development provided a convenient framework for the researcher to explore and describe Curie's development. The framework allowed the researcher to methodically extract, contextualise, and examine significant biographical data that related to Curie's psychosocial development. This methodical process also enhanced the dependability of the study.

Although no development theory can entirely capture human experience and individuality, Erikson's emphasis on including the entire life cycle into his theory provided a framework for viewing Curie's psychosocial development from a more holistic and life-long perspective, highlighting the dynamic inter-relationship of the changing individual in a changing environment. The researcher also evaluated the applicability of Erikson's constructs as they relate to Curie's life. It provided an opportunity to identify patterns, to make underlying connections, and consider ongoing ego development, therefore offering a chance for a rounded perspective.

While developmental stages and tasks are general and comparable, the study demonstrated that the underlying patterns of individuals' life structures are uniquely developed. The theory also aided in enhancing the credibility of constructs by defining clear conceptualisations of the factors that may influence generalised human development.

Another value of Erikson's theory is that it illuminates how unsuccessful resolution of early stages affected how individuals deal with the crises that appear in adulthood. Erikson's theory therefore provides answers applicable to practice. It could aid therapists in identifying key issues and skills their clients are required to address during therapy. At the same time, it offers a guide and measure to assess educational and child-rearing practices in terms of parents' ability to nurture and facilitate healthy emotional and cognitive development.

Erikson is often critiqued for presuming European male cultural values as the norm and not setting gender differences explicitly apart. Even though the researcher agrees with this criticism, studying Curie, a female scientist, using Erikson's theoretical framework, demonstrated that his conceptualisations are applicable across genders.

### 6.4.2 The Limitations of Psychosocial Personality Development

Academics have criticised Erikson for being too idealistic and optimistic (Roazen, 1976). However, when conceptualising a near optimally developed individual, such as Curie, the researcher is compelled to agree with Erikson's conceptualisations. Although Erikson's theory offers an in-depth explanation of *how* psychosocial development takes place, it lacks a description of *why* changes occur (Hook, 2002). For this reason, psychosocial theory requires the necessary clarification for why changes occur during personality development, based on both the adaptive and maladaptive functions of the ego.

Erikson's theory also does not make sufficient provision for or conceptualisation of the necessary balance required at each stage to acquire an ego strength. This reproach links with the influence of maladaptation and distortions on personality development, which the theory does not adequately explain. The researcher argues that it was Curie's unsuccessful resolution of Stages 1 and 2 that abetted her extraordinariness. For this reason, the researcher asks the question, "*Why* was it that Curie managed to utilise the distortion this failure caused, to her advantage while other individuals may have been arrested in their development?"

Whereas Erikson held identity was mainly stable by the end of adolescence, he did propose that identity continues to develop during adulthood. Regrettably, Erikson did not describe what this development may look like, and therefore left the researcher unable to explain personality changes Curie underwent as an adult and in late adulthood. Examples are Curie's ability to overcome her shyness and become more comfortable with appearing in public and being socially more interactive in her later life.

### 6.4.3 The Value of Psychobiographical Case Study Research.

This psychobiographical study offered a psychological explanation of Curie's life as it unfolded in eight psychosocial personality developmental stages as proposed by Erikson (1950, 1978). This study validated Erikson's belief that human development can be conceptualised and separated into phases that unfold over a lifetime. In addition, psychobiographical case study research illuminated the values and limitations of Erikson's theory (as discussed previously), which informs the recommendations pertaining to the theory at the end of this chapter.

Since psychobiographical case study research utilises a psychological theory, it enabled the researcher to highlight a different aspect of Curie as a unique individual. The study illuminated Curie's psychosocial personality development and hence supplied a new facet to



understanding her life. In addition, Curie's very different and challenging socio-cultural and historical context, highlighted the importance of considering context when one studies lived lives. For this reason, developmental theories that incorporate contextual and social aspects, such as Erikson's theory (1950, 1978) provide more latitude for a holistic study. Utilising a psychological theory not only offers a conceptual framework, but also allows the researcher to look at behavioural processes and patterns across the entire lifespan. Psychobiography, for this reason, represents an efficient merger of psychology and biography as a way to study lived experiences, especially finished lives (Fouché, 1999; Welman, 2009). Therefore, psychobiographical case study research allowed the researcher to describe and explore Curie's life within a formal theoretical framework, which has revealed the usefulness of developmental theory and illustrated the uniqueness of individuals. The researcher therefore found psychobiographical research to be a perfect and important learning exercise in psychological training. Finally, this psychobiography contributes to the growing number of completed psychobiographies within South African academia.

#### **6.4.4 The Limitations of Psychobiographical Case Study Research**

Chapter 4 provided a detailed account of the methodological challenges. These challenges included explicit subjectivity, analysing an absent subject, cross-cultural differences, reductionism, trustworthiness of data, elitism, easy genre, and inflated expectations. Only certain limitations that influenced this study are emphasised and explored in this section.

Explicit subjectivity was the first limitation that the researcher experienced. Even though the researcher had no preconceptions when choosing Curie as subject, the researcher tended to idealise Curie as the research progressed. The researcher also had the inclination to act on feelings evoked by the subject. As proposed by Anderson (1981), the researcher continually and critically self-examined these sentiments through reflexive practices during supervision and discussions with peers.

Analysing an absent subject also proved to be limiting despite the plethora of literature available on Curie's life. Firstly, reliable evidence on Curie's early childhood was impossible to obtain. As a result of the absence of data, the researcher used theory to project what the subject's infancy must have been like. This could discredit the psychoanalytic approach of psychobiographical case study research, since it could be accused of speculation and distorting facts. Secondly, several sources magnified Curie's contextual history, for example, sexism and

xenophobia, while others focused exclusively on her research and scientific contributions. Only a few biographers (Curie, 1937; Goldsmith, 2005; Quinn, 1995) paid more attention to Curie's private life. Thirdly, although many of Curie's private letters and diaries became available in the 1990s, the researcher did not have direct access to these resources. The researcher had to rely on the biographers' selective inclusion of extracts from these letters and diaries in the biographies. It is, for this reason, impossible to discern to what degree these inclusions were impartial or correctly contextualised. Fourthly, many of Curie's writings were initially written in either French or Polish, which could have resulted in translations' losing some of their original meaning and authenticity. Lastly, some texts contradicted one another, especially regarding Curie's maternal drive and capabilities. Since the interpretations of biographers were subjective, the researcher endeavoured to focus on Curie's private writings in her diaries and letters, and less on secondary data.

Reductionism as limitation was also problematic, in what Runyan (1982a) referred to as *critical period fallacy* and *eventism*. The researcher subdivided Curie's life into certain periods to facilitate data collection. However, the researcher found it difficult not to emphasise these single precarious events as too significant. To address this type of reductionism the researcher had to deliberately acknowledge the social and cultural context of the subject, together with the intricacies of the human personality. As discussed in Chapter 4, Ponterotto (2014) argued for *expansionism*. However, the researcher admits that owing to the large amount of data and limitations of a master's treatise (e.g., the word count limitation), a holistic, comprehensive representation of Curie's life was not always possible.

When considering trustworthiness of data, the study has relatively limited external credibility. However, the aim of this study was not to generalise findings but to describe and explain Curie's life. The study of Curie's psychosocial personality development cannot be statistically generalised to a larger population; however it may aid comparative psychobiographical studies as Ponterotto (2014) proposed.

Finally, there exists a moral objection that psychoanalytic approaches, such as psychobiography, often depreciate the memory of great individuals by representing them in terms of pathology or unresolved infantile conflicts. While the researcher endeavoured to deliver knowledgeable and theoretically grounded findings, the conclusions were speculative and contextualised within Erikson's (1950, 1975) theory. It is not the researcher's intention to define Curie's personality development as abnormal.

#### **6.4.5 The Values of the Psychobiographical Subject**

Numerous publications exist on Curie's life and her scientific work that abetted many societal contributions. However, an extensive search on the World Wide Web indicated that no one has written a psychobiography on her life. This research project is therefore the first psychobiographical study of Curie's life utilising Erikson's (1959) theory of psychosocial personality development. A psychological understanding of Curie's personality development may also furnish historians with a better comprehension of Curie as a unique individual, in addition to her scientific contributions and accomplishments.

In this study, it was noticeable that higher education requires finance, an above-average intelligence, and/or social opportunity. However, Curie's life demonstrated that determination, initiative, intelligence, self-concept, and ambition pave the way for achievement. Moreover, even when individuals are successful in these areas, they may still be vulnerable to uncertainty, self-doubt, and anxiety.

#### **6.4.6 The Limitations of the Psychobiographical Subject**

Possible limitations of Curie as a research subject were discussed in Chapter 4. In this section, the first criticism explored is Curie's perceived 'greatness', which could have made this study an elitist endeavour. Curie's perceived greatness and life story evoked feelings for the researcher, which implied added effort not to idealise the subject. However, during the course of the data-collection process, the researcher encountered and extracted data that also referred to Curie's humanity. These descriptions ranged from rebelliousness, obsessiveness, stubbornness, and discourtesy. It also included her indiscretions and infidelity. These imperfections were considered throughout the data analysis process as well as during the presentation and discussion of findings. This effort was in line with Howe (1997) and Runyan's (1988b) recommendations that a researcher may choose a research subject from any social context or class and should remain mindful that the focus of the study is on human personality development.

A second limitation of Curie as a research subject relates to cross-cultural differences. Curie's historical and social background do not correspond or are comparable with that those of the researcher. To address this limitation, the researcher consulted both primary and secondary sources of data to gain an in-depth and anthropological understanding of Curie within her socio-historical background. In fact, some biographers' focus on Curie's socio-historical context helped the researcher to gain a more detailed understanding. In addition, many contemporary

psychological models are not sensitive to cross-cultural differences and may not apply to an individual's life. However, Erikson (1975) developed his theory of psychosocial development in Europe, and which is compatible with Curie's generation and background.

### **6.5 Recommendations for future research**

The first recommendation is concerned with the exploration and explanation of Curie's life. The researcher is aware that the findings presented in this study should be considered only as a point of departure for investigating Curie's psychological and personality development in a more comprehensive and critical manner. The use of other theories or philosophies with existential themes such as individuality, freedom, consciousness, choice, and responsibility could offer different and/or better interpretations and explanations of Curie's life. Other conceptual frameworks could explain questions that arose during the examination of Curie's life. Curie proved to be a resilient individual; however the researcher was left with questions around the manner in which Curie coped with grief and loss, fame, and prejudice. Developmental psychology is suitable for psychobiographical studies and addresses many of the inherent potential vulnerabilities. The exclusive use of a developmental theory inevitably leads to a selective focus on specific data, while other data are discounted or omitted. However, utilising more than one theory was not within the scope of a master's thesis and concomitant limited word count.

The following suggestions pertain to Erikson's (1950, 1975) theory. Firstly, Erikson's theory is deficient in clarifying personality development that is not constructed on optimal identity development. As seen in Curie's personality development, she exhibited personality traits of perfectionism, obsessiveness, and stubbornness. Psychologists mostly regard these traits as negative and hindering, but they seemed to have aided Curie's accomplishments. For this reason, the researcher suggests that future research could identify the complementary influences as well as the relationship between maladaptation and malignancies in identity development. Secondly, Erikson's theory emphasises staged life crises alone. Curie's personality development indicated that aspects of her character remained consistent throughout her life. For this reason, future research could investigate identity development by evaluating the more persistent and lasting features of character that may not be only situational and related to individual stages. Thirdly, further research could investigate whether Erikson's stages have to happen in the proposed sequence and be limited to the suggested age ranges. Finally, because Erikson has also

been critiqued for his focus on childhood and adolescence, research surrounding the influence of life experiences and changes on personality development during adulthood could augment his theory.

With regard to psychobiographical research, the researcher recommends that academic institutions across South Africa, and the world, continue to promote it. Firstly, it has once again proved to be a unique means to investigate and understand psychological theories and individuals' lives in-depth. Secondly, it also improved the researcher's use and comprehension of its research methodology.

## **6.6 Chapter Summary**

This final chapter served to amalgamate and summarise the aims and findings of this psychobiographical study of Curie. It also provided an overview of its limitations and values, with recommendations for possible future research.

Throughout Curie's life she endured oppression, poverty, sexism, prejudice, xenophobia, and several losses that tormented and moulded her into the individual she became. Even though she endured adversity, some self-engendered, she sustained her hard work. A combination of perseverance and creativity led her to become one of the most important scientists in history. We often ask ourselves what sets extraordinary individuals apart from others. Perhaps we could answer that question in part with the outcome of this study and Curie's statement, "Life is not easy for any of us. But what of that? We must have perseverance and above all confidence in ourselves. We must believe that we are gifted for something and that this thing must be attained" (Curie, 1937, p. 116).

To conclude, this study illustrated how the psychobiographical case study provides a valuable means to utilise a psychological theory, in this case Erikson's (1959) theory of psychosocial personality development, to explore and explain extraordinary individuals' lives, such as that of Curie. It illustrated how unresolved infantile and childhood crises could give rise to traits, generally regarded as abnormal or malignant by psychologists, which could still encourage creativity and productivity that eventually might lead to unexpected and remarkable outcomes.

## References

- Adler, A. (1929). *The practice and theory of individual psychology* (2<sup>nd</sup> rev. ed, P. Radin, Trans.). London, England: Routledge & Kegan Paul.
- AIP Center for History of Physics. (2014). *Marie Curie and the science of radioactivity*. Retrieved October 21, 2014 from <http://www.aip.org/history/curie/romleg.htm>
- Airliners.net. (2007). Picture of the McDonnell Douglas MD-11 aircraft. Airliners.net. Retrieved from <http://www.airliners.net/photo/1207719/L/>
- Alexander, I. E. (1988). Personality, psychological assessment, and psychobiography. *Journal of Personality*, 56(1), 265–294. doi:10.1111/j.1467-6494.1988.tb00469.x
- Alexander, I. E. (1990). *Personology: Method and content in personality assessment and psychobiography*. Durham, NC: Duke University Press.
- Allport, G. W. (1937). *Personality: A psychological interpretation*. New York, NY: Henry Holt.
- Allport, G. W. [Jenny Gove Masterson, pseud.]. (1965). *Letters from Jenny*. New York, NY: Harcourt, Brace & World.
- American Philosophical Society. (2014). *Full text of "Minutes" of the American Philosophical Society, 24 May 1921*. Retrieved October 20, 2014 from [http://archive.org/stream/jstor-984523/984523\\_djvu.txt](http://archive.org/stream/jstor-984523/984523_djvu.txt)
- Anderson, J. W. (1981). The methodology of psychological biography. *Journal of Interdisciplinary History*, 11(3), 455–475. doi:10.2307/203628
- Ankony, R. C., & Kelley, T. M. (1999). The impact of perceived alienation on police officers' sense of mastery and subsequent motivation for proactive enforcement. *Policing: An International Journal of Police Strategies & Management*, 22(2), 120–134. Retrieved from <http://dx.doi.org/10.1108/13639519910271193>

- Barbour, R. S. (2001). Checklists for improving rigour in qualitative research: A case of the tail wagging the dog? *British Medical Journal*, 322(7294), 1115–1117.  
doi:10.1136/bmj.322.7294.1115
- Barenbaum, N., & Winter, D. (2013). Personality. In D. K. Freedheim & I. B. Weiner (Eds.), *Handbook of psychology. Vol. 1: History of psychology* (2<sup>nd</sup> ed., pp. 198–223). Hoboken, NJ: Wiley.
- Barzun, J., & Graff, H. F. (1977). *The modern researcher*. New York, NY: Harcourt Brace Jovanovich.
- Berg, B. L. (2001). *Qualitative research methods for the social sciences* (4<sup>th</sup> ed.). Boston, MA: Allyn & Bacon.
- Bjorklund, D. F., & Hernández Blasi, C. (2012). *Child & adolescent development: An integrated approach*. Belmont, CA: Wadsworth Cengage Learning.
- Boeree, C. G. (2006). *Personality theories*. Retrieved from  
<http://webpace.ship.edu/cgboer/perscontents.html>
- Boroş, S. (2009). *Exploring organizational dynamics*. London, England: Sage.
- Borzendowski, J. (2009). *Marie Curie: Mother of modern physics*. New York, NY: Sterling.
- Brennan, S. (1997). *Movies: Les Palmes de M. Schutz*. Retrieved from  
<http://www.nytimes.com/movies/movie/154828/Les-Palmes-de-M-Schutz/overview>
- Bromley, D. (1986). *The case-study method in psychology and related diciplines*. Chichester London, England: Wiley.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- Bukatko, D., & Daehler, M. W. (2003). *Child development: A thematic approach* (5<sup>th</sup> ed.). Boston, MA: Houghton Mifflin.

- Burgers, M. P. O. (1939). *Die mens Langenhoven*. Kaapstad, Suid-Afrika: Nasionale Pers.
- Burgers, M. P. O. (1960). *C.L. Leipoldt: 'n Studie in stof-keuse, -verwerking en -ontwikkeling*. Kaapstad: Nasionale Boekhandel.
- Burnell, B. (2013). *The life of Beyers Naudé: A psychobiographical study*. (Unpublished doctoral thesis). University of the Free State, Bloemfontein, South Africa.
- Carducci, B. J. (2009). *The psychology of personality* (2<sup>nd</sup> ed.). Malden, MA: Wiley-Blackwell.
- Carlson, R. (1971). Where is the person in personality research? *Psychological Bulletin*, 75(3), 203–219.
- Carlson, R. (1988). Exemplary lives: The use of psychobiography for theory development. *Journal of Personality*, 56(1), 105-138. doi:10.1111/j.1467- 6494.1988.tb00464.x
- Carr, A., & McNulty, M. (Eds.). (2006). *The handbook of adult clinical psychology: An evidence-based practice approach*. New York, NY: Routledge.
- Chiles, R. P. (1990). *William James: A damaged self journey toward reparation*. (Unpublished doctoral dissertation). Garrett Evangelical Seminary, Northwestern University, Evanston, IL.
- Chute, J. (2011, March 5). Video artist Steinkamp's flowery "Madame Curie" is challenging and stunning. *U-T San Diego*. Retrieved from <http://www.utsandiego.com/news/2011/mar/05/video-artist-steinkamp-madame-curie/>
- Corsini, R. J., & Marsella, A. J. (1983). *Personality theories, research & assessment*. Itasca, IL: Peacock.
- Corey, G. (2005). *Case approach to counseling and psychotherapy* (6<sup>th</sup> ed.). Sydney, Australia: Thomson-Brooks/Cole.
- Craig, G. J., & Baucum, D. (2002). *Human development* (9<sup>th</sup> ed.). Upper Saddle River, NJ: Prentice Hall.



Curie, E. & Sheean, V. (1937). *Madame Curie: A biography*. Garden City, NY: Doubleday, Doran.

Curie, M. (1923). *Pierre Curie*. Paris, France: Payot.

Denzin, N. K., & Lincoln, Y. S. (2000). Paradigmatic controversies, contradictions, and emerging confluences. In N. K. Denzin, & Y. S. Lincoln (Eds.), *The handbook of qualitative research* (2<sup>nd</sup> ed., pp. 163–188). Thousand Oaks, CA: Sage.

Denzin, N. K., & Lincoln, Y. S. (2003). *Strategies of qualitative inquiry* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.

Douvan, E. (1997). Erik Erikson: critical times, critical theory. *Child Psychiatry and Human Development*, 28(1), 15–21.

Edwards, D. J. A. (1998). Types of case study work: A conceptual framework for case-based research. *Journal of Humanistic Psychology*, 38(3), 36–70.  
doi:10.1177/00221678980383003

Elms, A. C. (1994). *Uncovering lives: The uneasy alliance of biography and psychology*. New York, NY: Oxford University Press.

Elms, A. C. (2007). Psychobiography and case study methods. In R. W. Robins, R. C. Fraley & R. F. Krueger (Eds.), *Handbook of research methods in personality psychology* (pp. 97–113). New York, NY: Guilford Press.

Elms A. C., & Song A. V. (2005). Alive and kicking: The problematic of political psychobiography. In W. T Schultz (Ed.), *Handbook of psychobiography* (pp. 301–310). New York, NY: Oxford University Press.

Elovitz, P. H. (2003). Psychoanalytic scholarship on American presidents. In J. A. Winer & J. W. Anderson (Eds.), *The annual of psychoanalysis: Psychoanalysis and History* (Vol. 31, pp. 135–149). Hillsdale, NJ: Analytic Press.

Emling, S. (2012). *Marie Curie and her daughters: The private lives of science's first family*.

New York, NY: Palgrave Macmillan.

Erikson, E. H. (1950). *Childhood and society*. New York, NY: Norton.

Erikson, E. H. (1958). *Young man Luther: A study in psychoanalysis and history*. New York, NY: Norton.

Erikson, E. H. (1959). *Identity and the life cycle*. New York, NY: Norton.

Erikson, E. H. (1963). *Childhood and society* (2<sup>nd</sup> ed.). New York, NY: Norton.

Erikson, E. H. (1964). *Insight and responsibility*. New York, NY: Norton.

Erikson, E. H. (1965). *The challenge of youth*. Garden City, NY: Anchor Books, Doubleday.

Erikson, E. H. (1968). *Identity, youth, and crisis*. New York, NY: Norton.

Erikson, E. H. (1969). *Gandhi's truth: On the origins of militant nonviolence*. New York, NY: Norton.

Erikson, E. H. (1975). "Identity crisis" in perspective. In E. H. Erikson (Ed.), *Life history and the historical moment* (pp. 17–47). New York, NY: Norton.

Erikson, E. H. (1975). *Life history and the historical moment*. New York, NY: Norton.

Erikson, E. H. (1977a). *Childhood and society*. St Albans: Triad.

Erikson, E. H. (1977b). *Toys and reasons: Stages in the ritualization of experience*. New York, NY: Norton.

Erikson, E. H. (1980). *Identity and the life cycle*. New York, NY: Norton.

Erikson, E. H. (1978). *Adulthood: An essay*. New York, NY: Norton.

Erikson, E. H. (1987). The human life cycle. In S. Schlein (Ed.), *A way of looking at things* (pp. 595–610). New York, NY: Norton.

Erikson, E. H., Erikson, J. M., & Kivnick, H. Q. (1986). *Vital involvement in old age*. New York, NY: Norton.

European Commission. (2012). *Marie Curie Actions: Where innovative science becomes success*. Luxembourg: EU. Retrieved from [http://ec.europa.eu/research/mariecurieactions/documents/documentation/publications/eu-marie-curie-actions-fellowships-innovative-science-becomes-success-publication\\_en.pdf](http://ec.europa.eu/research/mariecurieactions/documents/documentation/publications/eu-marie-curie-actions-fellowships-innovative-science-becomes-success-publication_en.pdf)

Evans, R. I. (1967). *Dialogue with Erik Erikson*. New York, NY: Harper & Row.

Fadiman, C., & Bernard, A. (2000). *Bartlett's book of anecdotes*. Boston, MA: Little, Brown.

Famous Scientists. (2015). Marie Curie [photograph]. Retrieved from <http://www.famousscientists.org/marie-curie/>

Fancher, R. (2006). [Review of the book *Handbook of psychobiography*, edited by W. T. Schultz]. *Journal of the History of the Behavioral Sciences*, 42(3), 287–289.  
doi:10.1002/jhbs.20177

Fisher L. E. (1994). *Marie Curie*. New York, NY: Macmillan.

Fouché, C. B., & De Vos, A. S. (2005). Quantitative research designs. In A. S. de Vos, H. Strydom, C. B. Fouché, & C. S. L. Delport (Eds.), *Research at grass roots: For the social sciences and human services professions* (pp. 137–149). Pretoria: Van Schaik.

Fouché, J. P. (1999). *The life of Jan Christiaan Smuts: A psychobiographical study* (Unpublished doctoral thesis). University of Port Elizabeth, South Africa.

Fouché, J. P., Smit, R., Watson, M. B., & Van Niekerk, R. (2007). *Psychobiographical research in South Africa: A systematic review from 1995–2004*. Poster presented at the 13<sup>th</sup> Annual South African Psychology Congress: The State of the Discipline, Durban, South Africa, 28–31 August.

- Fouché, J. P., & Van Niekerk, R. (2005). *Psychobiography: An interdisciplinary approach between psychology and biography in the narrative reconstruction of personal lives*. Paper presented at the International Society for Theoretical Psychology Congress, Cape Town, South Africa, 20–24 June.
- Fouché, J. P., & Van Niekerk, R. (2010). Academic psychobiography in South Africa: Past, present and future. *South African Journal of Psychology*, 40(4), 495–507. doi: 10.1177/008124631004000410
- Fowler, J. W. (1981). *Stages of faith: The psychology of human development and the quest for meaning*. San Francisco, CA: Harper & Row.
- Franklin Institute. (2014). *Marie Curie*. Retrieved from <https://www.fi.edu/laureates/marie-curie>
- Freud, S. (1910). *Leonardo da Vinci and a memory of his childhood*. New York, NY: Norton.
- Geertz, C. (1973). *The interpretation of cultures: Selected essays*. New York, NY: Basic Books.
- Giroud, F. (1986). *Marie Curie, a life*. New York, NY: Holmes & Meier.
- Goldsmith, B. (2005). *Obsessive genius: The inner world of Marie Curie*. New York, NY: Norton.
- Green, J. L., Camilli, G., & Elmore, P. B. (Eds.). (2006). *Handbook of complementary methods in education research*. Mahwah, NJ: Lawrence Erlbaum.
- Greene, R. R., Graham, S. A., & Morano, C. (2010). Erikson's healthy personality, societal institutions, and Holocaust survivors. *Journal of Human Behavior in the Social Environment*, 20(4), 489–506.
- Hamachek, D. (1990). Evaluating self-concept and ego status in Erikson's last three psychosocial stages. *Journal of Counseling and Development*, 68(6), 677–683.
- Hergenhahn, B. R., & Olson, M. H. (2003). *An introduction to theories of personality* (6<sup>th</sup> ed.). Upper Saddle River, NJ: Prentice Hall.

- Hersen, M., & Thomas, J. C. (Eds.). (2006). *Comprehensive handbook of personality and psychopathology: Adult psychopathology* (Vol. 2). Hoboken, NJ: Wiley.
- Hoare, C. H. (2005). Erikson's general and adult developmental revisions of Freudian thought: "Outward, forward, upward". *Journal of Adult Development*, 12(1), 19–31.
- Holden, N. E. (2004). Atomic weights and the International Committee – a historical review. *Chemistry International*, 26(1). Retrieved from [http://www.iupac.org/publications/ci/2004/2601/1\\_holden.html](http://www.iupac.org/publications/ci/2004/2601/1_holden.html)
- Hook, D. (2002). Erikson's psychosocial stages of development. In D. Hook, J. Watts, & K. Cockcroft (Eds.), *Developmental psychology*. Cape Town, South Africa: University of Cape Town Press.
- Howe, M. J. (1997). Beyond psychobiography: Towards more effective syntheses of psychology and biography. *British Journal of Psychology*, 88(2), 235–248. doi:10.1111/j.2044-8295.1997.tb02632.x
- Hurlburt, R. T., & Knapp, T. J. (2006). Munsterberg in 1898, not Allport in 1937, introduced the terms 'idiographic' and 'nomothetic' to American psychology. *Theory & Psychology*, 16(2), 287–293. doi:10.1177/0959354306062541
- Institut Curie. (2010). *Curie museum*. Retrieved from <http://www.institut-curie.org/foundation/curie-museum>
- Iwaniec, D. (2006). *The emotionally abused and neglected child: Identification, assessment and intervention: A practice handbook* (2<sup>nd</sup> ed.). Chichester London, England: Wiley.
- Jacobs, A. (2004). *Cornelius Jacobus Langenhoven: A psychobiographical study*. (Unpublished master's dissertation). University of Port Elizabeth, South Africa.
- Jolly, M. (Ed.). (2001). *Encyclopedia of life writing: Autobiographical and biographical forms*. London, England: Fitzroy Dearborn.

- Kőváry, Z. (2011). Psychobiography as a method. The revival of studying lives: New perspectives in personality and creativity research. *Europe's Journal of Psychology*, 7(4), 739–777.
- Krefting, L. (1991). Rigor in qualitative research: The assessment of trustworthiness. *American Journal of Occupational Therapy*, 45(3), 214–222.
- Lacan, J. (1977). *Ecrits: A selection*. New York, NY: Norton.
- Lewicki, A. M. (2002). Marie Sklodowska Curie in America, 1921. *Radiology*, 223(2), 299–303.
- Lewis, J. J. (2015, May 25). *Marie Curie, mother of modern physics*. Retrieved from [http://womenshistory.about.com/od/mariecurie/p/marie\\_curie.htm](http://womenshistory.about.com/od/mariecurie/p/marie_curie.htm)
- Lindegger, G. (2006). Research methods in clinical research. In M. Terre Blanche, K. Durrheim, & D. Painter (Eds.), *Research in practice: Applied methods for the social sciences* (2<sup>nd</sup> ed., pp. 455–475). Cape Town: University of Cape Town Press.
- Macbeth, D. (2001) On “reflexivity” in qualitative research: Two readings, and a third. *Qualitative Inquiry*, 7(1), 35–68.
- Mack, J. E. (1971). Psychoanalysis and historical biography: Aspects of a developing affinity. *Journal of the American Psychoanalytic Association*, 19(1), 143–179.
- Maier, H. W. (1988). *Three theories of child development* (3<sup>rd</sup> ed.). Lanham, MD: University Press of America.
- Manganyi, N. C. (1996). *A black man called Sekoto*. Johannesburg, South-Africa: Witwatersrand University Press.
- Marcia, J. E. (1966). Development and validation of ego identity status. *Journal of Personality and Social Psychology*, 3(5), 551–558.
- Maree, J. G., & Pietersen, J. (2010). Sampling. In J. G. Maree (Ed.), *First steps in research* (pp. 169–181). Pretoria: Van Schaik.

Marii Skłodowskiej-Curie. Retrieved from <http://www.coi.waw.pl/>

Marie Curie. (2015, May 25). Retrieved from <http://www.biography.com/people/marie-curie-9263538>

Marie Skłodowska-Curie Bridge, Warsaw. (2015, March 31). In *Wikipedia, The Free Encyclopedia*. Retrieved from [http://en.wikipedia.org/w/index.php?title=Marie\\_Sk%C5%82odowska-Curie\\_Bridge,\\_Warsaw&oldid=654304502](http://en.wikipedia.org/w/index.php?title=Marie_Sk%C5%82odowska-Curie_Bridge,_Warsaw&oldid=654304502)

Marie Skłodowska-Curie Museum. (2014, December 27). In *Wikipedia, The Free Encyclopedia*. Retrieved from [http://en.wikipedia.org/w/index.php?title=Marie\\_Sk%C5%82odowska-Curie\\_Museum&oldid=639857594](http://en.wikipedia.org/w/index.php?title=Marie_Sk%C5%82odowska-Curie_Museum&oldid=639857594)

Maria Curie-Skłodowska University, Lublin. (2014a). Retrieved from <http://www.umcs.pl/>

Maria Curie-Skłodowska University, Lublin. (2014b). *Study in Lublin*. Retrieved from <http://study.lublin.eu/en/Marie-curie-sklodowska-university>

Marie Curie Organization. (2014). Marie Curie cancer care. Retrieved from <https://www.mariecurie.org.uk/>

Markstrom, C. A., & Kalmanir, H. M. (2001). Linkages between the psychosocial stages of identity and intimacy and the ego strengths of fidelity and love. *Identity: An International Journal of Theory and Research*, 1, 179–196. doi: 10.1207/S1532706XID0102\_05.

McAdams, D. P. (1988). Biography, narrative, and lives: An introduction. *Journal of Personality*, 56(1), 1–18. doi:10.1111/j.1467-6494.1988.tb00460.x

McAdams, D. P. (1994). *The person: An introduction to personality psychology* (2<sup>nd</sup> ed). Fort Worth, TX: Harcourt Brace College Publishers.

McAdams, D. P. (1996). Personality, modernity, and the storied self: A contemporary framework for studying persons. *Psychological Inquiry*, 7(4), 295–321.

- McAdams, D. P. (2000). *The person: An integrated introduction to personality psychology* (3<sup>rd</sup> ed.). San Diego, CA: Harcourt Brace College.
- McAdams, D. P. (2001). The psychology of life stories. *Review of General Psychology*, 5(2), 100–122.
- McAdams, D. P. (2005). What psychobiographers might learn from personality psychology. In W. Schultz (Ed.), *Handbook of psychobiography* (pp. 64–83). New York, NY: Oxford University Press.
- McAdams, D. P. (2006). *The person: A new introduction to personality psychology* (4<sup>th</sup> ed.). Hoboken, NJ: Wiley.
- McAdams, D. P. (2009). *The person: An introduction to the science of personality psychology* (5<sup>th</sup> ed.). Hoboken, NJ: Wiley.
- McLeod, J. (1994). *Doing counselling research: An expanded sourcebook*. London, England: Sage.
- Meyer, W. F., Moore, C., & Viljoen, H. G. (2008). *Personology: From individual to ecosystem* (4<sup>th</sup> ed.). Johannesburg: Heinemann.
- Miasto Stołeczne Warszawa (Capital City of Warsaw). (2011, December 1). *We have got the Marie Skłodowska–Curie Bridge*. Retrieved from <http://sklodowska.um.warszawa.pl/en/content/we-have-got-Marie-sk-odowska-curie-bridge>
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.
- Morris, C. G., Maisto, A. A., & Levine, A. (2002). *Psychology: An introduction* (11<sup>th</sup> ed). Upper Saddle River, NJ: Prentice Hall.
- Most inspirational woman scientist revealed. (2009, 2 July). *New Scientist*, (2715). Retrieved from <http://www.newscientist.com/article/mg20327156.600-most-inspirational-woman-scientist-revealed.html>



- Mould, R. (1998). The discovery of radium in 1898 by Marie Sklodowska-Curie (1867–1934) and Pierre Curie (1859–1906) with commentary on their life and times. *British Journal of Radiology*, 71(852), 1229–1254.
- Moustakas, C. E. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.
- Munter, P. O. (1975). Psychobiographical assessment. *Journal of Personality Assessment*, 39(4), 424–428.
- Murray, H. A. (Ed.) (1949). *Introduction to H. Melville. Pierre: or, the ambiguities*. New York, NY: Hendricks House.
- Musée Curie. (2013, October 1). In *Wikipedia, The Free Encyclopedia*. Retrieved from [http://en.wikipedia.org/w/index.php?title=Mus%C3%A9\\_Curie&oldid=575285139](http://en.wikipedia.org/w/index.php?title=Mus%C3%A9_Curie&oldid=575285139)
- Neuman, W. L. (2006). *Social research methods: Qualitative and quantitative approaches*. Boston, MA: Allyn & Bacon.
- Newman, B., & Newman, P. (2003). *Development through life: A psychosocial approach* (8<sup>th</sup> ed.). Belmont, CA: Brookes/Cole.
- New York Times*. (1995, April 21). *Marie Curie enshrined in Pantheon*. Retrieved from <http://www.nytimes.com/1995/04/21/world/marie-curie-enshrined-in-pantheon.html>
- Nieuwenhuis, J. (2010). Introducing qualitative research. In K. Maree (Ed.). *First steps in Research* (pp. 46–68). Pretoria, South Africa: Van Schaik.
- Nobelprize.org. (2014a). *Marie Curie–Photo Gallery*. Retrieved from [http://www.nobelprize.org/nobel\\_prizes/physics/laureates/1903/marie-curie-photo.html](http://www.nobelprize.org/nobel_prizes/physics/laureates/1903/marie-curie-photo.html)
- Nobelprize.org. (2014b). *The Nobel Prize in Chemistry 1911*. Retrieved from [http://www.nobelprize.org/nobel\\_prizes/chemistry/laureates/1911/](http://www.nobelprize.org/nobel_prizes/chemistry/laureates/1911/)
- Nobelprize.org. (2014c). *The Nobel Prize in Physics 1903*. Retrieved from [http://www.nobelprize.org/nobel\\_prizes/physics/laureates/1903/](http://www.nobelprize.org/nobel_prizes/physics/laureates/1903/)

- Oelofsen, N. (2012). *Developing reflective practice: A guide for students and practitioners of health and social care*. Banbury, England: Lantern.
- Ogilvie, M. B. (2004). *Marie Curie: A biography*. Westport, CN: Greenwood.
- Pasachoff, N. E. (1996). *Marie Curie and the science of radioactivity*. New York, NY: Oxford University Press.
- Perry, M. J. (2012). *The life of Olive Schreiner: A psychobiography*. (Unpublished doctoral thesis). University of the Free State, Bloemfontein, South Africa.
- Pierre and Marie Curie University. (2015, March 30). In *Wikipedia, The Free Encyclopedia*. Retrieved from [http://en.wikipedia.org/w/index.php?title=Pierre\\_and\\_Marie\\_Curie\\_University&oldid=654145934](http://en.wikipedia.org/w/index.php?title=Pierre_and_Marie_Curie_University&oldid=654145934)
- Ponterotto, J. G. (2005). Integrating qualitative research requirements into professional psychology training programs in North America: Rationale and curriculum model. *Qualitative Research in Psychology*, 2(2), 97–116. doi:10.1191/1478088705qp035oa
- Ponterotto, J. G. (2010). Qualitative research in multicultural psychology: Philosophical underpinnings, popular approaches, and ethical considerations. *Cultural Diversity & Ethnic Minority Psychology*, 16(4), 581–589.
- Ponterotto, J. G. (2014). Best practices in psychobiographical research. *Qualitative Psychology*, 1(1), 77–90.
- Ponterotto, J. G., & Reynolds, J. D. (2013). The “genius” and “madness” of Bobby Fischer: His life from three psychobiographical lenses. *Review of General Psychology*, 17(4), 384–398.
- Quinn, S. (1995). *Marie Curie: A life*. New York, NY: Simon & Schuster.
- Redniss, L. (2010). *Radioactive: Marie & Pierre Curie: A tale of love & fallout*. New York, NY: HarperCollins.

- Roazen, P. (1976). *Erik H. Erikson: The power and limits of a vision*. New York, NY: Free Press.
- Roberts, B. (2002). *Biographical research*. Buckingham, England: Open University Press.
- Rollyson, C. E. (2008). *Biography, a user's guide*. Chicago, IL: Ivan R. Dee.
- Rudestam, K. E., & Newton, R. R. (2007). *Surviving your dissertation: A comprehensive guide to content and process* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage.
- Runyan, W. M. (1982a). In defense of the case study method. *American Journal of Orthopsychiatry*, 52(3), 440–446. doi:10.1111/j.1939-0025.1982.tb01430.x
- Runyan, W. M. (1982b). *Life histories and psychobiography: Explorations in theory and method*. New York, NY: Oxford University Press.
- Runyan, W. M. (1983). Idiographic goals and methods in the study of lives. *Journal of Personality*, 51(3), 413–437. doi:10.1111/j.1467-6494.1983.tb00339.x
- Runyan, W. M. (1984). *Life histories and psychobiography: Explorations in theory and method*. New York, NY: Oxford University Press.
- Runyan, W. M. (1988a). Progress in psychobiography. *Journal of Personality*, 56(1), 295–326. doi:10.1111/j.1467-6494.1988.tb00470.x
- Runyan, W. M. (1988b). Reconceptualizing the relationships between history and psychology. In W. M. Runyan (Ed.), *Psychology and historical interpretation* (pp. 247-295). New York, NY: Oxford University Press.
- Runyan, W. M. (Ed.), (1988c). *Psychology and historical interpretation*. New York, NY: Oxford University Press.
- Sadock, B. J., Kaplan, H. I., & Sadock, V. A. (2007). *Kaplan & Sadock's synopsis of psychiatry: Behavioral sciences/clinical psychiatry* (10<sup>th</sup> ed.). Philadelphia, PA: Wolter Kluwer/Lippincott Williams & Wilkins.

- Schultz, W. T. (Ed.). (2005). *Handbook of psychobiography*. New York, NY: Oxford University Press.
- Schunk, D. H. (1985). Self-efficacy and classroom learning. *Psychology in the Schools*, 22(2), 208–223.
- Schwandt, T. A. (2001). *Dictionary of qualitative inquiry* (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage.
- Shaffer, D. R. (1996). *Developmental psychology* (4<sup>th</sup> ed.). Belmont, CA: Brooks/Cole.
- Silverman, D. K. (1993). *Interpreting qualitative data: Methods for analysing talk, text, and interaction*. London, England: Sage.
- Simonton, D. K. (1994). *Greatness: Who makes history and why*. New York, NY: Guilford.
- Simonton, D. K. (1999). *Origins of genius: Darwinian perspectives on creativity*. New York, NY: Oxford University Press.
- Simonton, D. K. (2003). Scientific creativity as constrained stochastic behavior: The integration of product, person, and process perspectives. *Psychological Bulletin*, 129(4), 475–494. <http://dx.doi.org/10.1037/0033-2909.129.4.475>
- Slater, C. L. (2003). Generativity versus stagnation: An elaboration of Erikson's adult stage of human development. *Journal of Adult Development*, 10(1), 53–65.
- Sneed, J. R., Whitbourne, S. K., & Culang, M. E. (2006). Trust, identity, and ego integrity: Modeling Erikson's core stages over 34 years. *Journal of Adult Development*, 13(3–4), 148–157. doi: 10.1007/s10804-007-9026-3.
- Sokolovsky, M. (1996). Case study as a research method to study life histories of elderly people: Some ideas and a case study of a case study. *Journal of Aging Studies*, 10(4), 281–294.
- Sowers, K. M., & Dulmus, C. N. (Eds.). (2008). *The comprehensive handbook of social work and social welfare* (Vols 1–4). Hoboken NJ: Wiley.

- Stake, R. (2005). Qualitative case studies. In N. K. Denzin & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry* (2<sup>nd</sup> ed., pp. 443-466). Thousand Oaks, CA: Sage.
- Stanley, L. (1992). *The auto/biographical I: The theory and practice of feminist auto/biography*. Manchester London, England: Manchester University Press.
- Steele, P. (2006). *Marie Curie: The first great woman scientist*. Washington, DC: National Geographic Society.
- Steinke A. E., & Xavier, R. (1987). *Marie Curie and the discovery of radium*. New York, NY: Barron's.
- Thimm, J. C. (2010). Relationships between early maladaptive schemas and psychosocial developmental task resolution. *Clinical Psychology & Psychotherapy*, 17(3), 219–230. doi: 10.1002/cpp.647
- Thimm, J. C. (2013). Early maladaptive schemas and interpersonal problems: A circumplex analysis of the YSQ-SF. *International Journal of Psychology & Psychological Therapy*, 13(1), 113–124.
- Tomaszewski, I. (2011). 2011 “The Year of Marie Skadowska-Curie”. *Cosmopolitanreview.com*. Retrieved October 20, 2014 from <http://cosmopolitanreview.com/2011-the-year-of-sklodowska-curie/>
- Trochim, W., & Donnelly, J. P. (2006). *The research methods knowledge base* (3<sup>rd</sup> ed.). Mason, OH: Atomic Dog Publishing.
- University at Buffalo (State University of New York). (2014). *Marie Curie medallion returns to UB Polish collection by way of eBay*. Retrieved from <http://www.buffalo.edu/news/releases/2007/09/8829.html>
- Van der Merwe, L. M. (1978). *Ingrid Jonker: 'n Psigologiese analise*. (Unpublished doctoral thesis). University of Pretoria, South Africa.
- Van Niekerk, R. (2007). *'n Psigobiografiese ontleding van Christiaan Neethling Barnard se*

- loopbaanontwikkeling* (Unpublished master's thesis). University of Stellenbosch, South Africa.
- Van Os, B. (2008). Psychological method and the historical Jesus: The contribution of psychobiography. *HTS Theological Studies/Teologiese Studies*, 63(1), 327–346.
- Vorster, M. S. (2003). *The life of Balthazar Johannes Vorster: A psychobiographical study* (Unpublished master's thesis). University of Port Elizabeth, South Africa.
- Watson, F., Burrows, H., & Player, C. (2002). *Integrating theory and practice in social work education*. London, England: Jessica Kingsley.
- Watson, J. (2002). Intentionality and caring-healing consciousness: A practice of transpersonal nursing. *Holistic Nursing Practice*, 16(4), 12–19.
- Welchman, K. (2000). *Erik Erikson: His life, work and significance*. Buckingham London, England: Open University Press.
- Welman, C. (2009). *The life of Emily Hobhouse: A psychobiographical study*. (Unpublished master's thesis). University of the Free State, Bloemfontein, South Africa.
- Wikimedia.org. (n.d). Marie Curie [Photograph] retrieved from <http://ufvcascade.ca/2015/01/22/marie-curie-lectures-consider-diasporic-identity-and-belonging/>
- Wikipedia Commons. (2012). *Marie Sklodowska-Curie birthplace mural.jpg*. Retrieved from [http://commons.wikimedia.org/wiki/File:Marie\\_Sklodowska-Curie\\_birthplace\\_mural.jpg](http://commons.wikimedia.org/wiki/File:Marie_Sklodowska-Curie_birthplace_mural.jpg)
- Willig, C. (2008). *Introducing qualitative research in psychology: Adventures in theory and method* (2<sup>nd</sup> ed.). Maidenhead London, England: McGraw-Hill/Open University Press.
- Witmer, J. M., & Sweeney, T. J. (1992). A holistic model for wellness and prevention over the life span. *Journal of Counseling & Development*, 71(2), 140–148. doi:10.1002/j.1556-6676.1992.tb02189.x

- Woll, H. (2013). Process diary as methodological approach in longitudinal phenomenological research. *Indo-Pacific Journal of Phenomenology*, 13(2),1–11. doi: 10.2989/IPJP.2013.13.2.2.1176.
- Yin, R. Y. (1994). *Case study research: Design and methods*. Thousand Oaks, CA: Sage.
- Yin, R. Y. (2003). *Case study research: Design and methods* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage.
- Yin, R. Y. (2006). Case study methods. In J. L. Green, G. Camilli & P. B. Elmore (Eds.), *Handbook of complementary methods in education research* (pp. 111–122). Mahwah, NJ: Lawrence Erlbaum.
- Yin, R. Y. (2009). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage.

APPENDIX A

Photographs Depicting Curie's Life



*Figure 2.* Marie Curie, aged 16 (Famous Scientists, 2015).

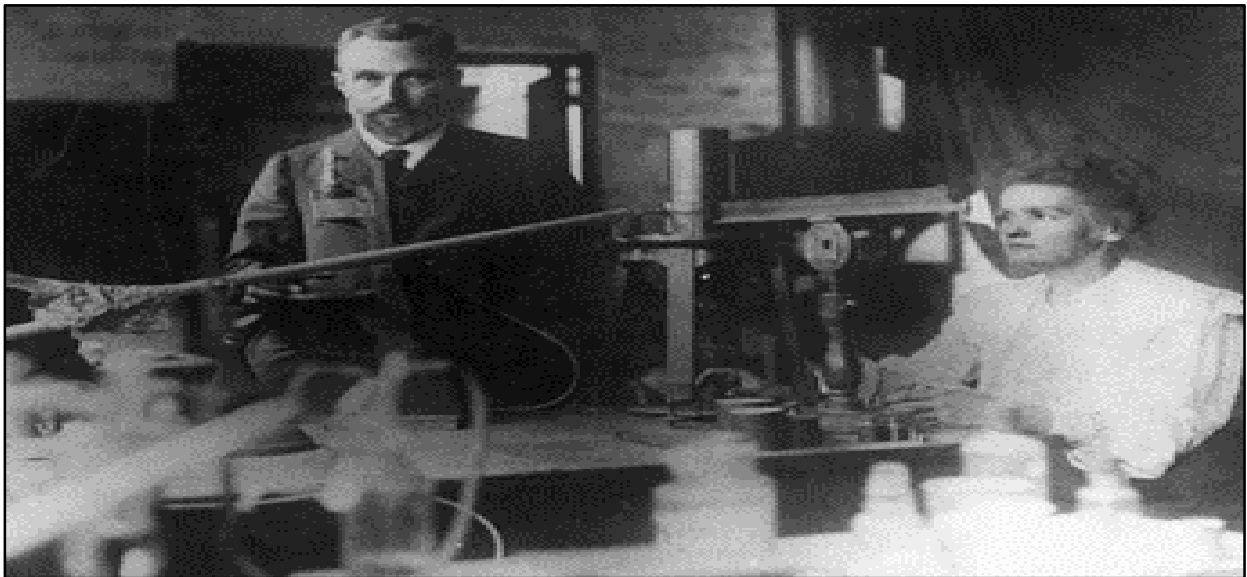


*Figure 3.* Wedding photo of Marie and Pierre Curie, 1895 (Nobelprize.org, 2014a).





*Figure 4.* Pierre and Marie Curie on their honeymoon bicycle trip in 1895 (Nobelprize.org, 2014a).



*Figure 5.* Pierre and Marie Curie in the shed at l'École de Physique et de Chimie Industrielles in Paris, France, where they made their discoveries in 1898 (Nobelprize.org, 2014a).



*Figure 6.* Marie Curie and her daughters in 1905 (Nobelprize.org, 2014a).



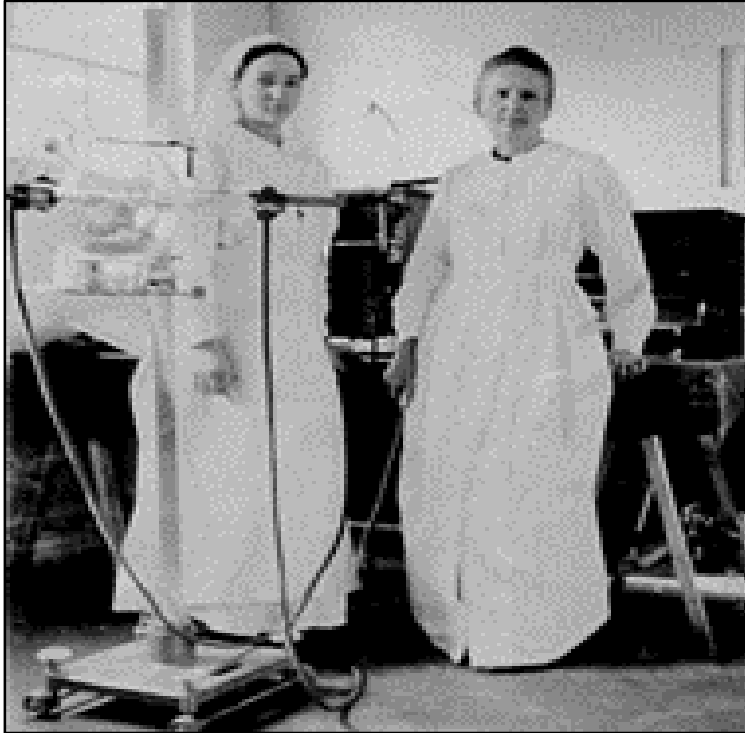
*Figure 7.* The daily Excelsior article in which they contested Marie's candidacy for the French Academy with scandalous and racist claims in 1911 (Nobelprize.org, 2014a).



*Figure 8.* Marie Curie and four of her students (photo taken between 1910 and 1915) (Nobelprize.org, 2014a).



*Figure 9.* Photograph of the first Solvay conference in 1911. Seated (L–R): W. Nernst, M. Brillouin, E. Solvay, H. Lorentz, E. Warburg, J. Perrin, W. Wien, M. Skłodowska-Curie, and H. Poincaré. Standing (L–R): R. Goldschmidt, M. Planck, H. Rubens, A. Sommerfeld (Nobelprize.org, 2014a).



*Figure 10.* Marie Curie and her daughter Irène at the Hoogstade Hospital in Belgium, in 1915 (Nobelprize.org, 2014a).



*Figure 11.* Marie operating a mobile X-ray unit during World War I, 1914 (Nobelprize.org, 2014a).



*Figure 12.* Marie Curie in the laboratory at the Radium Institute during her final days, 1921 (Nobelprize.org, 2014a).



*Figure 13.* Marie Curie with President of the United States, Warren G. Harding, head of the procession down the stairs of the White House after the ceremony in 1921 (Institut Curie, 2010).

## APPENDIX B

## Major Accomplishments, Awards, Honours, and Tributes Curie Achieved

1. Curie received several awards during her lifetime; these include the Nobel Prize in Physics (1903) (Nobelprize.org, 2014c), Davy Medal (1903, with Pierre), Matteucci Medal (1904, with Pierre) (Curie, 1923), Elliott Cresson Medal (1909) (Franklin Institute, 2014), Nobel Prize in Chemistry (1911) (Nobelprize.org, 2014c), and the Franklin Medal of the American Philosophical Society (1921) (American Philosophical Society, 2014).
2. A poll carried out by the journal, *New Scientist* in 2009 revealed that Curie was voted as the “most inspirational woman in science” (Most inspirational woman scientist revealed, 2009).
3. At San Diego’s Museum of Contemporary Art, an artistic installation celebrating “Madame Curie” can be found in the Jacobs Gallery (Chute, 2011).
4. Poland and France declared the year 2011 as the Year of Marie Curie as well as the International Year of Chemistry by the United Nations (Tomaszewski, 2011)
5. In 1995, Curie became the first woman to be entombed in the Panthéon in Paris on her own merits (*New York Times*, 1995).
6. In science, a unit of radioactivity was named the *curie* (symbol Ci), the element with atomic number 96 was named *curium*, and the three radioactive minerals *curite*, *sklodowskite*, and *cuprosklodowskite* were named in honour of the Curies (Borzendowski, 2009).
7. A fellowship programme of the European Union for young scientists, the “Marie Curie Actions” was established, for those wishing to work in a foreign country (European Commission, 2012).
8. In Poland, Curie received honorary doctorates from the Lwów Polytechnic (1912), Poznań University (1922), Kraków's Jagiellonian University (1924), and the Warsaw Polytechnic (1926) (Tomaszewski, 2011).
9. In 2007, a metro station in Paris was renamed to honour both of the Curies (Borzendowski, 2009).

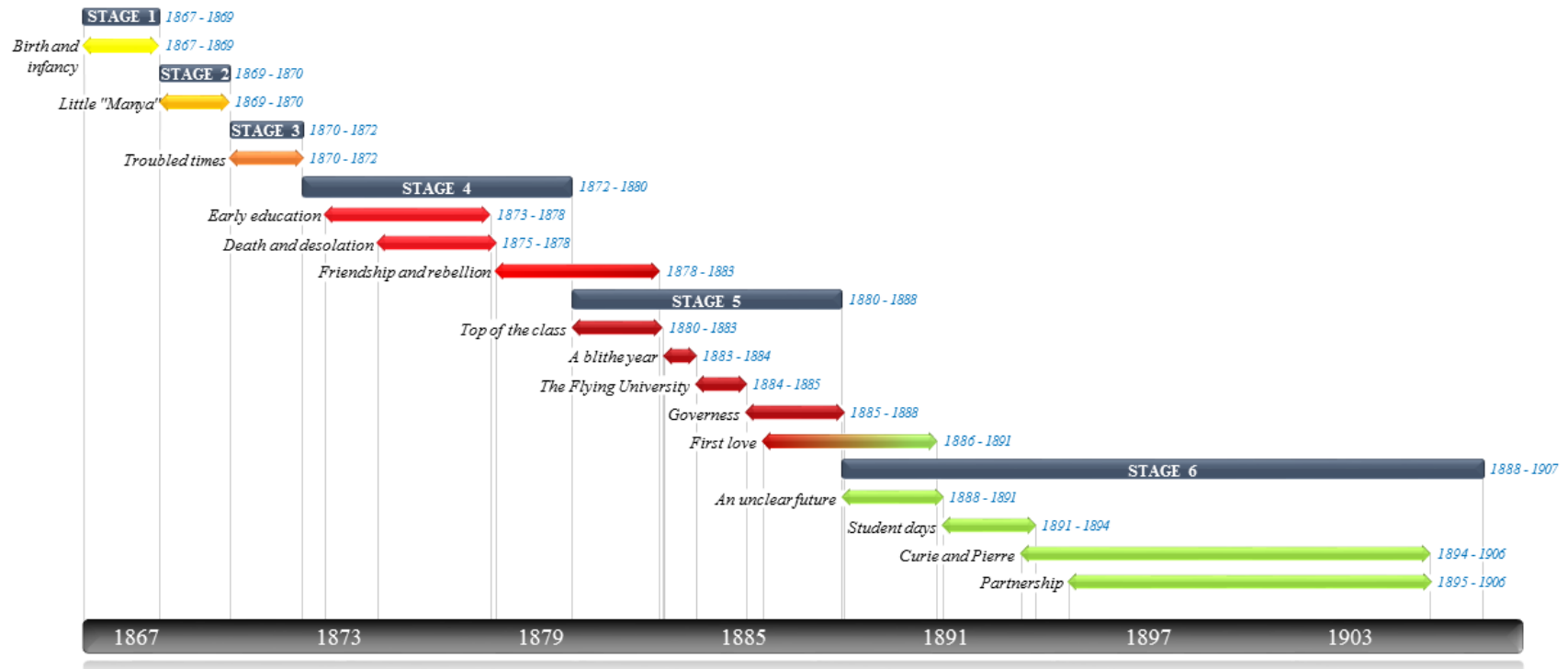
10. A Polish nuclear research reactor was named *Marie*, as well as the 7000 Curie asteroid and a KLM McDonnell Douglas MD-11 (Airliners.net, 2007).
11. Several institutions also bear her name: the two Curie institutes, namely the Marie Skłodowska Curie Institute of Oncology in Warsaw (Centrum Onkologii-Instytut, n.d.) and the *Institut Curie* in Paris (Curie Institute, Paris, 2014).
12. She is the patron of Maria Curie-Skłodowska University, in Lublin, founded in 1944 (Maria Curie-Skłodowska University, Lublin, 2014a) and the patron of Paris's Pierre and Marie Curie University (Pierre and Marie Curie University, 2015), established in 1971.
13. In 1948 in Britain, the Marie Curie Cancer Care was established to care for the terminally ill (Marie Curie Organization, 2014).
14. Two museums are devoted to Curie. In 1967, the Marie Skłodowska-Curie Museum was established in Warsaw's "New Town" at her birthplace (Marie Skłodowska-Curie Museum (2014), and her laboratory in Paris is preserved as the *Musée Curie* that has been open since 1992 (Institut Curie, 2010).
15. Several works of art bear her likeness. A statue of Curie in front of Warsaw's Radium Institute was unveiled in 1935 (Tomaszewski, 2011). There is also a stained- glass panel, the Marie Skłodowska-Curie Medallion, featured in the University at Buffalo's Polish Room created by Jozef Mazur in 1955 (University at Buffalo, 2014).
16. Biographies devoted to Curie include *Madame Curie* (Curie, 1937), *Marie Curie: A Life* (Giroud, 1986; Quinn, 1995), *Obsessive Genius: The Inner World of Marie Curie* (Goldsmith, 2005), *Radioactive: Marie and Pierre Curie: A Tale of Love and Fallout* (Redniss, 2010), *Marie Curie and Her Daughters* (Emling, 2012), and *Marie Curie: A Biography* (Ogilvie, 2004).
17. Even a US Oscar-nominated film, named *Madame Curie*, and based on her life, was released in 1943. More recently, in 1997, a French film about Curie and Pierre was released, *Les Palmes de M. Schutz*. It was adapted from a play of the same name, *False Assumptions* in which the ghosts of three other female scientists observe events in her life (Brennan, 1997).

18. Curie's portrait has also appeared on bills, stamps, and coins all around the world (Tomaszewski, 2011).
19. On the 2011 centenary of Curie's second Nobel Prize (1911), an allegorical fresco was painted on the facade of her birthplace in Warsaw. It depicts an infant Curie, holding a test tube from which emanates the elements that she would discover as an adult: polonium and radium (Wikipedia Commons, 2012).
20. In 2011, a new bridge in Warsaw crossing the Vistula River was named after her (Marie Skłodowska-Curie Bridge, Warsaw, 2015).

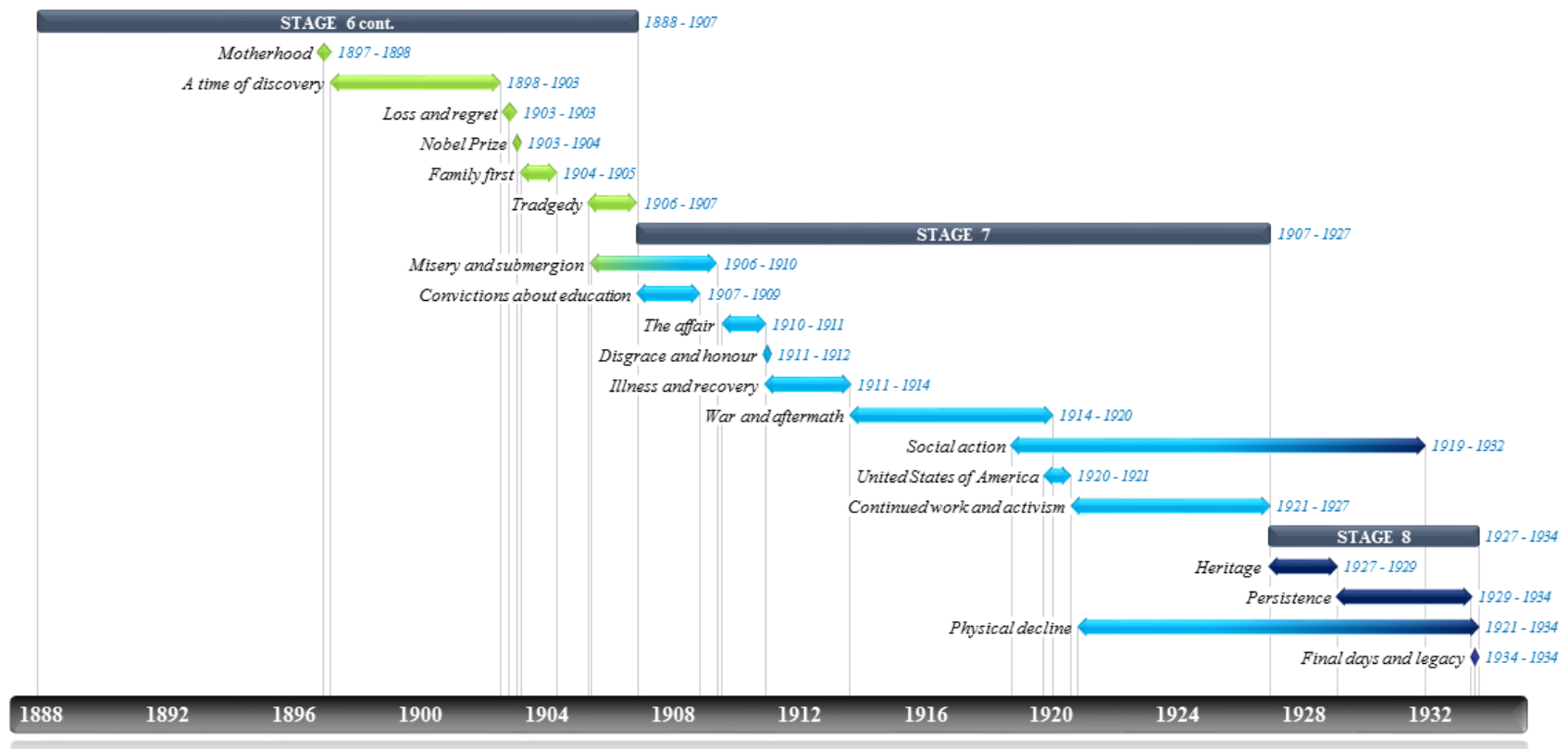


## APPENDIX C

## A Timeline of the Significant Periods in Curie's Life in Relation to Erikson's Eight Stages of Psychosocial Development



Timeline continues



## APPENDIX D

## A Timeline of Curie's Life Events and Accomplishments in Relation to Erikson's Eight Stages of Psychosocial Development

