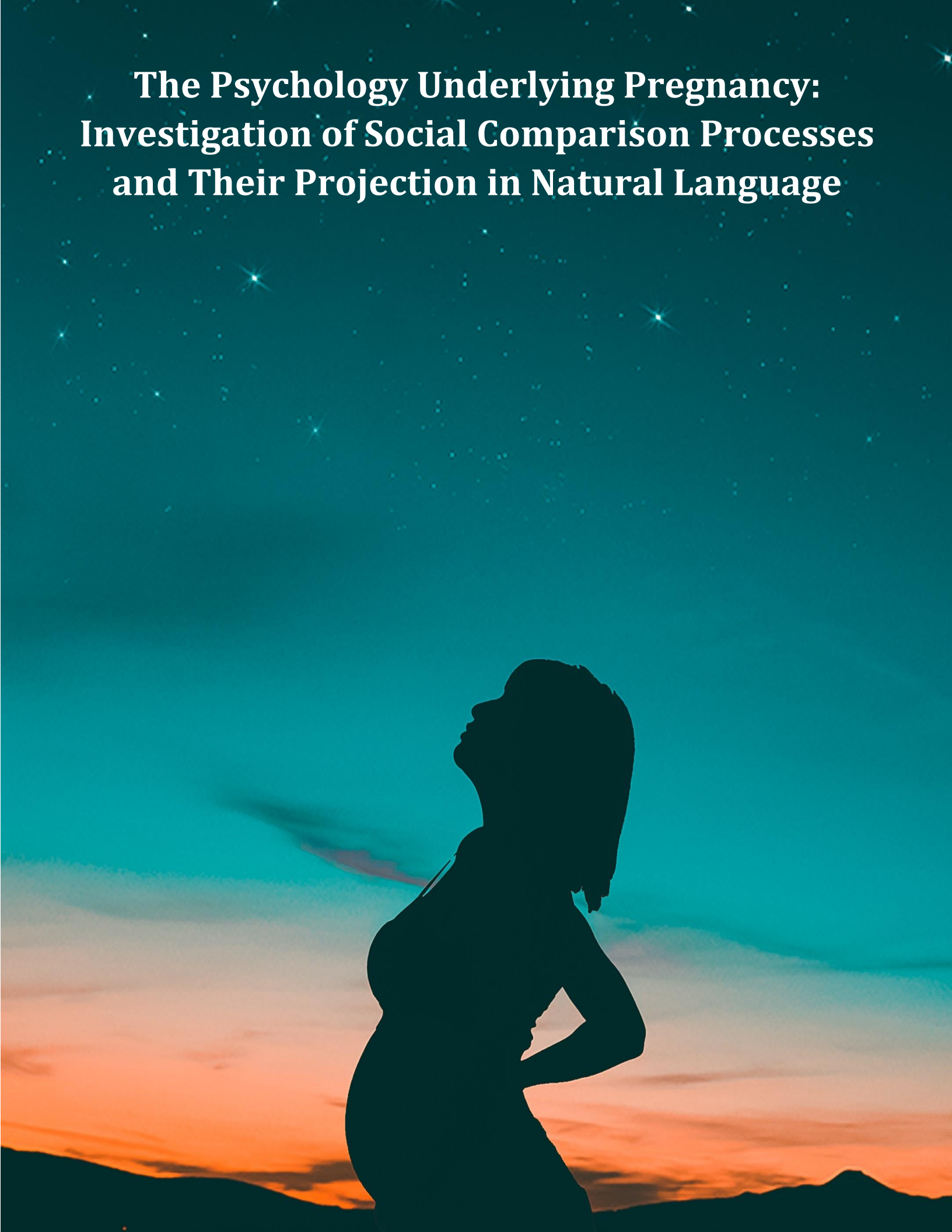
The Psychology Underlying Pregnancy: Investigation of Social Comparison Processes and Their Projection in Natural Language



The Psychology Underlying Pregnancy: Investigation of Social Comparison Processes and Their Projection in Natural Language

by

Kiran Gopalakrishnan

to obtain the degree of Master of Science in Management of Technology at the Delft University of Technology, to be defended publicly on 16/09/2022 at 14:30 CEST

Student number:	5361419	
Project duration:	April 10, 2022 to September 16, 2022	
Thesis committee:	Prof. dr. F.M. (Frances) Brazier,	TU Delft, Chair
	Dr. L. (Laurens) Rook,	TU Delft, First Supervisor
	Dr. I. (Iulia) Lefter,	TU Delft, Second Supervisor

TU Delft Delft University of Technology

Executive Summary

In addition to the physiological alterations that occur relatively predictably during pregnancy, psychological transformations also occur at the same time. The baby is developing, but so are a mother's fears and imaginations about her unborn child. Such imaginations about the unborn child and parenting methods are sure to evoke a range of emotions, including happiness, excitement, curiosity, anxiety, frustration, and maybe depression.

New personality traits emerge throughout the prenatal period, whereas others eventually depart. Learning and adjusting to the new life that comes with bringing a baby into the world are the top priorities during pregnancy. Both the emotional and physical aspects of adjustment must be given equal consideration throughout this phase. Being emotionally adaptable is crucial to overall well-being throughout pregnancy. As a result, pregnant women, especially first-time mothers, are always looking into coping mechanisms to ease the adjustment to their new role as mothers. Nevertheless, a person's opinion of their ideas, skills, and circumstances can vary based on their social standing. According to the social comparison theory, comparing oneself to others can help people achieve a range of personal goals.

Social comparison is a personality characteristic. Individuals who are highly social comparison-oriented make excessive social comparisons and are more affected by the outcomes. Social comparisons can be done intentionally, but more frequently they are done involuntarily. Social networking sites play a key role in the contemporary digital age in terms of personal experience sharing and constructive debate. However, research has found that the need for social comparison increases at times of stress, uncertainty, or adjustment. As a result, in unexpected and upsetting settings like pregnancy, social comparison may become more significant.

The social comparison, psychology, and linguistics aspects of pregnancy had all previously been the subject of very few research, however, they had been done so independently. The objective of this research is to jointly comprehend the social, psychological, and linguistic aspects of pregnancy. A survey that was published on Reddit communities collected 159 responses from the three questionnaires (Iowa-Netherlands Comparison Orientation Measure, Gratitude During Pregnancy Scale, and Tilburg Pregnancy Distress Scale), as well as a textual question on using social media while being pregnant. Social comparison and intense emotional expression are two of the numerous opportunities offered by social networking platforms. A correlation and linear regression analysis were used in this study to investigate the association between the three sub-scales and the selected LIWC (Linguistic Inquiry and Word Count) categories.

The Comparison of Opinions (INCOM Sub-scale) with Antenatal Care (GDPS Sub-scale) and the Social (GDPS Sub-scale) variables revealed a positive correlation. The positive correlation also suggests that a lack of social and psychological support from one's spouse or broader social group is one

of the most significant predictors of prenatal distress and the symptoms of mental health disorders. The Comparison of Abilities (INCOM Sub-scale) with the Negative Affect (TPDS Sub-scale) variable revealed a highly significant positive correlation. This shows that risk evaluations conducted through social networking sites for opinions or ability comparisons are connected to emotions and biological stress reactions. The responses of the participants were also examined to understand how emotional expression, social comparison, and social media usage fit into the context of pregnancy. It was obvious that peer support and convenient access to information were the key reasons why many mothers used social media during their pregnancy. Due to some opinionated content and lack of representation, some people, however, found social media to be overwhelming.

Pregnant women frequently receive recommendations to social networking sites for awareness and investigation of their new motherhood identity, as well as to learn more about specific health issues, treatment, and recovery methods. Sincere, genuine, and even visceral perspectives from women who have experienced a range of emotions during their pregnancy can often be found on several social media platforms linked to maternity. Multiple social and psychological elements are involved in order to promote the mother's as well as the child's overall health and well-being. Therefore, the results of this study could significantly strengthen social and psychological research on pregnancy.

Acknowledgement

The only way to do great work is to love what you do!

- Steve jobs

This aphorism by Steve Jobs holds true for me. I began interning at Philips for Marketing Insights Analytics Personal Health (Mother Child Care) about one year ago. It all eventually started with my desire to use my technical expertise as well as technology management in marketing. I couldn't have wished for a better method to feed my insatiable curiosity and enthusiasm. Everything around us unfolds for a sense of direction. Even if not with cutting-edge technology, I've always wanted to make a meaningful contribution to pregnancy care. That is when I came across an interesting article via the Social Daily resource platform at Philips. Pregnancy is a time of many conflicting emotions, and it is particularly problematic for first-time parents. I emphasize it as a crucial period because nothing is consistent in this ever-changing world, and a mother is always striving for the best for her child. This inspired me to conduct an extensive study on many elements of pregnancy in order to create a specialized and original thesis subject for my master's.

This exploratory adventure began in October 2021, with several iterations required to meet the standards for my master's thesis. Throughout this process, I was able to narrow down my thesis with a strong focus on analyzing pregnancy distress and linguistics observation because of Dr. Laurens Rook. I would like to express my gratitude to Dr. Laurens Rook for his continuous guidance, encouragement, and commitment to impart his considerable expertise in social and health psychology. The chair of the thesis, Prof. Dr. Frances Brazier, and my second supervisor, Dr. Iulia Lefter, were both a huge help and a support in deciding on the best strategy and effectively achieving the objective.

Last but not least, I must express my deep gratitude to my family, Acha, Ma, and Kishore. My family gives me all of my strength. I always thought that all I wanted in life was to be successful, but through time, I came to realize that what I really wanted was to succeed while also making my family proud. I will make every effort in my capability to continue making them proud and happy. You all truly act as my inspiration!

Finally, despite many difficulties in 2020, I am extremely satisfied with my decision to start my master's in Management of Technology at TU Delft. Fantastic people and amazing experiences have filled the last two years to the brim! One mantra I always repeat to myself and would like to impart to someone who needs additional inspiration is,

"You may have to compromise your decisions according to situations but never compromise your goals for any situation!"

Contents

List of Figures

List of Tables

1 Introduction

Complex social and psychological changes occur during pregnancy in women (Hiremath, 2016). Due to the paucity of prior studies, the pregnancy care domain is filled with unpredictability, and lack of information. The background information and an overview of the state of social psychological research on pregnancy are provided in section 1.1 of this chapter. The relevance of this research is discussed in section 1.3. The main research question and associated sub-questions of the thesis are presented in section 1.2. Finally, the report structure for this study is presented in section 1.4.

1.1 Background

Prenatal, delivery, and parenthood are extremely important stages in the life of a woman. Women go through physical effects as well as transition to their newfound tasks and duties as a mother during these periods (Schoch-Ruppen et al., 2018; Landoni et al., 2022). For some women, these periods creates concern over changes in their individual connections, the surroundings, cultural structures, and sometimes social values (Symes, 2017). Maternity is a huge emotional occasion too (Hiremath, 2016). A woman learns to imagine the child she is carrying during her pregnancy by going through many stages such as emotional connection initiation, anticipation, and preparation for birth (Brazelton and Cramer, 2018). As a result, expectant mothers are more willing to pursue knowledge to improve their mental and physical well-being for the sake of their child (Buchanan et al., 2021).

Ever since late 20th century, the area of psychological science has grown to encompass studies on how diverse social, psychological, and environmental characteristics influence health challenges and behaviors (Tennen et al., 2000). Social comparison theory is one approach to studying health implications, and personal health consequences, deciding whether to seek medical help for physical illnesses and adjusting to severe illness conditions (Suls et al., 2002). In the healthcare field, social comparisons can serve a variety of purposes, namely self-evaluation, self-enhancement, and self-improvement (Suls and Wheeler, 2013). People confronted with experiences, such as pregnancy, may feel driven to seek parallels to mitigate the negative aspects and many other unpleasant implications of their circumstances (De Choudhury et al., 2013; De Choudhury and De, 2014). A woman might pursue this while discovering ways to balance the sacrifices that come with becoming a mother and how to make adjustments to the way her mentality, physicality, interpersonal relationships, and career are changing (Symes, 2017).

Social networking sites have altered communication processes in past the few years (Kramer et al., 2014). Investigation of linguistic research in social networking sites has changed its attention to the medium's potential effect on our everyday routines, both intellectually and emotionally (Pennebaker et al., 2003). Additionally, they include a setting in which the apparent consequences of sickness can be masked, which, when paired with the veil of anonymity, makes it easier for people to discuss sensitive or humiliating subjects (De Choudhury and De, 2014). Self-disclosure and social support are effective

in boosting perceptions of self-efficacy and living standards (De Choudhury and De, 2014). There are four major elements that impact birth outcomes in the context of pregnancy (Dunkel Schetter, 2011): individual-level (medicinal, biological, metabolic profiles, cognitive and behavioral stress levels and emotional resonance, and coping behaviour patterns, wealth and resources), relationship-level (interpersonal connection, support networks, partner connection, and family dynamics), sociocultural-level (race/ethnicity, birthplace, cultural integration, cultural beliefs), and community-level (physical world, neighborhood characteristics, medical support access and efficiency, and associated territorial considerations) (Dunkel Schetter and Lobel, 2012). The volume and variety of information that is available regarding all four factors affecting birth outcomes have transformed as a result of the digital revolution (Phelan, 2010; Friedman, 2011; De Choudhury and De, 2014; Walker et al., 2018).

1.2 Research Objective & Approach

It is observed that three different situations influence behavior change: interpersonal settings (one-on-one communication between the influencer and the individual), persuasion settings (one influencer attempting to influence many individuals), and finally, mass media settings (communication through a medium attempting to reach and influence millions of people all around the world) (Zimbardo and Leippe, 1991). Individuals are affected by others in significant ways through a variety of channels or settings by which a person compares his or her judgments with others, consciously or unconsciously. Social networking sites are rapidly becoming a medium for exchanging health-related knowledge (De Choudhury and De, 2014). Web-based healthcare resource searching and exchange activities are effective in assisting individuals in managing their particular concerns (Friedman, 2011). Internet communities and support networks establish a suitable atmosphere for individuals to interact with others who experience comparable challenges, unhappiness, discomfort, illness, or anguish, and so serve as efficient and affordable avenues for seeking aid and guidance regarding healthcare topics. Information through social media platforms allows investigating the interrelationship between social comparison, language use, and the expression of emotions during pregnancy.Therefore, the main research objective is as follows:

> *To investigate the relationship between emotional expressions and social comparisons of pregnant women using natural language.*

In order to understand emotional expressions and social comparisons using natural language, a widely used text analysis tool, LIWC-22 (Linguistic Inquiry and Word Count) will be employed. The LIWC is a text processing software tool that determines the percentage of total words in a text message that falls into any of the categories under the predefined themes as follows: Linguistic Dimensions, Psychological Processes, and Expanded Dictionary. A glossary that links significant psychological concepts and notions with terms, sentences, or other textual constructs, is the foundation of LIWC-22. It can be applied to investigate a particular person, a collection of individuals over a period, or the entire social networking world. In order to account for new developments in text processing, the most mod-

ern iteration, LIWC-22, has drastically changed both the vocabulary and the system choices (Boyd et al., 2022). The program, like earlier iterations, is intended to analyze solitary or many linguistic data rapidly and effectively. In addition, the application strives to be accessible and versatile in its functioning, enabling the participant to investigate vocabulary usage from many perspectives.

This study intends to investigate how different linguistic categories relate to social comparison and emotional expression. Prior studies had, up to this moment, been focused primarily on one aspect, the majority, for instance, centered on pregnancy experience (De Choudhury et al., 2013; De Choudhury and De, 2014; Kramer et al., 2014; Seabrook et al., 2016; Schoch-Ruppen et al., 2018). This study will concentrate on discovering relationships between the LIWC-22 categories in accordance with the following three scales: the Tilburg Pregnancy Distress Scale (TPDS), the Gratitude During Pregnancy (GDP) scale, and the Iowa-Netherlands Comparison Orientation Measure (INCOM) Scale. Thus, this study will focus on the following question:

What role do emotional expressions, social comparisons and social media usage play in the textual contributions that women disclose about their pregnancy experiences?

The following sub-research questions (SQ) have been devised to investigate the main research questions.

1. *What are women's emotional expressions indicating about their experience during pregnancy?*
2. *What role do social comparisons play during pregnancy?*
3. *What role do social networking sites play in assisting mothers during their pregnancy?*

The dominating linguistic categories in the natural language of pregnant women will be identified using SQ1. Understanding the impact of both positive and negative affect on pregnancy will be aided by this question. The major source of social comparison during pregnancy and the effect will both be deduced by SQ2. SQ3 will support research into how social networking sites affect pregnancy.

1.3 Research Relevance

Many social comparison studies have focused on life-threatening events that are difficult to control, with breast cancer being the most prominent example. According to this investigation, a substantial percentage of women with breast cancer took advantage of those opportunities to compare themselves to individuals who had more health difficulties (Suls and Wheeler, 2013). Similarly, positive influence via social networks could also help in saving an individual from feeling stressed throughout fetal development (Lupien et al., 2009), making her increasingly open to discovering new anxiety and depression coping techniques (Schetter, 2009). Therefore, it is important to comprehend how this theory functions in the context of pregnancy.

Furthermore, the number of people that can join a digital community of support is not restricted, allowing users to seek a potentially greater set of opinions and viewpoints than it would be available in a face-to-face situation (Coulson, 2013). This has led to the development of many digital health care applications (Gonzalez et al., 2021; Bokolo, 2021). The journey to parenting is regarded as being one of life's most significant accomplishments, bringing alongside enormous joy and satisfaction (Hansen, 2012). One cannot indeed generalize the emotional realities of pregnant women and their journey towards childbirth (Duncan and Bardacke, 2010) as it is well known that everyone will not undergo the same experience when facing a stressful situation like pregnancy (Skouteris, 2012; Meeussen and Van Laar, 2018). Thus, this study's investigation of social, psychological, and linguistic components might contribute to the creation of more individualized digital prenatal care and health-tracking tools that could potentially improve overall pregnancy well-being.

1.4 Report Structure

The report's structure is presented in this section. The background, relevance, and research objective are all presented in Chapter 1 of this study, which is followed by the research questions. Following this is Chapter 2, which is a review of the literature and includes studies on linguistics, social comparison, and general pregnancy aspects. Chapter 3 proceeds with a description of the methodology used for this research. The results chapter, Chapter 4, then offers the correlational and linear regression analyses between the scales and the selected LIWC categories. This is followed by Chapter 5, in which the limitations and potential directions for further study are discussed along with the topic's scientific and practical relevance. Finally, Chapter 6 compiles and highlights the findings.

2 Literature Review

2.1 Pregnancy: An Ordinary Miracle

Pregnancy is a life-changing event. Life-changing events are defined as personal experiences that have an impact on a person's everyday schedule (Holmes and Rahe, 1967), such as social, psychological, or environmental occurrences that necessitate a change in the person's regular activities (Edvardsson et al., 2011; Phelan, 2010). Especially compared to the corresponding women who are not pregnant, pregnant women are more driven to improve their lifestyle behaviors (Jackson et al., 2011) and is one of the important life-changing events as it paves the way to motherhood (Pratami et al., 2021). However, the ability to modify these patterns is contingent on one's willingness to embrace motherhood (Lindqvist et al., 2017). Early prenatal lifestyles, physical requirements of maternity, and everyday situations all influence an individual's ability and chance to choose and/or sustain beneficial lifestyle habits throughout fetal development (Walker et al., 2020).

2.1.1 The Psychology Behind Pregnancy

Women go through various psychological and biological alterations in a brief period throughout pregnancy and after birth (Meireles et al., 2015; Skouteris, 2012; Walker et al., 2015; Watson et al., 2015). An entire pregnancy journey is separated into three trimesters: the first, second, and third trimesters. The mother starts to gain body mass in the first trimester (weeks 1–12), and emotional fluctuations, such as depressive episodes and tension, may develop (Cunningham et al., 2014). Women are more likely to suffer from exhaustion and discomfort at this time, which can muddle or amplify psychological reactions (Symes, 2017). The second trimester (weeks 13–25) is marked by the emergence of bowel movements and the appearance of the pregnancy belly (Cunningham et al., 2014). This is also the trimester in which women would be the most emotionally resilient and healthy (Wu et al., 2021). This is the stage wherein the baby's movement is felt by the mother for the first time, and she may become more physiologically relaxed while continuing to envision her baby (Stern, 2020). There is a higher gain in gestational weight in the final trimester of pregnancy (from week 26 onwards), and this is the phase of highest worry for most women due to the closeness of childbirth (Liu et al., 2021). The anxiety of anything happening unacceptable with the delivery and/or their newborn may resurface throughout this period (Symes, 2017).

The journey to maternity commences before conception and is affected by a combination of variables (Dunkel Schetter and Lobel, 2012), including an individual's context, social context, and the conditions of pregnancy (Mares et al., 2011). Complex psychological changes occur during the prenatal period (Hiremath, 2016). Such alterations occur as a result of family situations, childbearing, physiological imbalances, and neurological changes (Jomeen, 2004). A woman learns to imagine the child she is carrying during her pregnancy by going through many stages such as emotional connection initiation, anticipation, and preparation for birth (Brazelton and Cramer, 2018). The psychological and social

aspects of pregnancy develop in parallel with the biological responses (Meireles et al., 2015). A woman must also learn to reconcile the sacrifices associated with motherhood, as well as adjust to changes in her mentality, physicality, interpersonal relationships, and career (Symes, 2017).

During the pregnancy and delivery journey, an individual's identity shifts from that of a daughter (reliant on family members) to that of a mother (primary caretaker for her infant) (Stern, 1991). The person leans on their experience of identities with their own parent (or other nurturing personalities) during this transformation (Fraiberg et al., 2003). For several females, these periods create concern over changes in their individual connections, surroundings, cultural structures, and sometimes social values (Dunkel Schetter and Lobel, 2012). Maternity is a huge emotional occasion too (Hiremath, 2016). Expecting mothers may find themselves unwilling to handle also with added requirements of pregnancy and birth to various external factors (Dunkel Schetter, 2011). The development of preferences and perspectives in a person's life through the comparison process can have an impact on monitoring fetal movements (Walker et al., 2020). Prenatal and childbirth may be a time of significant personality reorganization, resulting in insights into how the mother herself was raised (Stern, 1991). As a result, expectant mothers are more willing to pursue knowledge to improve their mental and physical well-being for the sake of their children (Buchanan et al., 2021), and one of the easiest methods to evaluate themselves is to compare themselves with other mothers.

2.2 Social Comparison Process

2.2.1 Social Comparison Theory

Social comparison is defined as a "process in which people assess their own talents, views, behaviors, sentiments, physical characteristics, achievements, or any other part of themselves in comparison to other people and/or groups" (Festinger, 1954, pp. 118). A person's perceptions, feelings, and actions are all influenced by social comparisons i.e., by making comparisons between themselves with external representations or ideal images (Festinger, 1954). These representations could be a relevant comparison to other people or a relation to the objective world (Sherif, 1936). Individuals have a basic desire for correctness and intellectual clarity, something that they fulfill by gathering clarification about the truth of their ideas and the sufficiency of their capabilities by trying to compare themselves to others and assessing their beliefs (Festinger, 1954). For example, a student might sometimes make a comparison between oneself to the group's standout candidate to accomplish more and better his or her capabilities (Dijkstra et al., 2008). People believe that the idealistic representations presented by someone else are attainable and real, thus they compare themselves with others or the idealistic representations (Hyman, 1942).

Festinger's original theory claims that a person has a desire to assess oneself by comparing their thoughts and competencies to those of another, with the condition that the magnitude of comparison is bigger when the representation of comparison is considered similar to oneself (Festinger, 1954). As

a result, Festinger predicted a unidirectional upward desire in ability evaluations. As a consequence, many individuals evaluate their talents in comparison to those who achieve relatively higher standards (Dijkstra et al., 2008; Suls and Wheeler, 2013). Individuals in Western civilization are in a constant drive to develop oneself. It is impossible to appropriately judge one's competence and viewpoint when others' skills and ideas differ significantly from one's own, either above or below (Suls and Wheeler, 2013). Thus, comparisons are typically made with people that seem slightly better off in terms of their capabilities (Suls et al., 2000).

Social comparisons are more nuanced than previously imagined, according to studies, and individuals have a much more dynamic role in making comparisons than previously supposed (Suls et al., 2002). Several major developments have occurred in the theory, including the rank order theory, proxy theory and triadic theory. The rank order theory (Wheeler, 1966; Suls and Wheeler, 2013) explains three sorts of comparisons: upward comparison (the target outperforms the individual making comparisons), downward comparison (the individual making comparisons outperforms the target), and lateral comparison (neutral). According to the proxy principle, when someone is competent or comfortable with one task (do I like X?), the same individual will be effective at another attributable mission (Wheeler et al., 1997; Suls and Wheeler, 2013). According to the triadic theory (Suls et al., 2000), there are three sorts of comparisons that may be questioned: preference assessment (do I like X?), belief assessment (is X true?), and preference prediction (will I like X?). This hypothesis supports the basic idea that comparable others are the most significant for opinion comparisons, while also emphasizing the relevance of different others in this regard. Thus, each comparison process is motivated by objectives that might lead to self-evaluation, self-enhancement, or self-improvement (Friedman, 2011).

2.2.2 Social Comparison Motives

Social comparison is a character trait, and social comparison orientation is the propensity to participate in social comparison (Civitci and Civitci, 2015). Social comparisons are sometimes depicted as purposeful pursuits carried out to achieve specific intentions or objectives (Taylor et al., 1996). The process of comparison being influenced by comparison objectives such as self-evaluation, self-improvement, and self-enhancement (Suls and Wheeler, 2013) will be explained in the following segments.

Self-evaluation

Initially, Festinger (1954) claimed that the purpose of social comparisons was to achieve correct self-knowledge or realistic self-evaluations. In such instances, a person chooses reference benchmarks that are comparable to them on the essential characteristic. If individuals undergo comparisons to others who are not like them, the outcome would be uncertain (Gerber et al., 2018; Marsh and Parker, 1984). It is also highlighted that direct comparisons with specific individuals in the obvious social surroundings (like friends or family) or unexpected circumstances might have a bigger impact on the evaluation (Zell and Alicke, 2010; Anderson et al., 2012).

Self-enhancement

Self-enhancement is essentially the urge to establish an optimistic personality outlook (Friedman, 2011). However, Wills (1981) proposed that during social comparisons, this attribute may instead contribute to the adoption of lower standards as a result of fairly consistent downward comparisons because people want to increase their self-esteem with a beneficial reference. Since downward comparisons can safeguard or increase one's self-esteem, those with vulnerable self-esteem are more likely to experience them (Suls and Wheeler, 2013). Breast cancer patients, for example, stated that in attempting to cope/deal with the illness, they instinctively evaluated themselves to other people with cancer (Suls and Wheeler, 2013; Friedman, 2011; Wood et al., 1985).

Self-improvement

A third and final desire that social comparison may ultimately serve is self-improvement (Suls and Wheeler, 2013; Friedman, 2011). To gather knowledge and recommendations about ways to grow and enhance abilities, individuals may seek constant comparisons, especially with upward standards of behavior who are better than they are (Taylor and Lobel, 1989). In contrast to self-enhancement, some individuals appear to favor this assessment. Molleman et al. (1986) discovered that people with cancer liked to connect with similar patients with cancer who were comparable to them or marginally better off than them. This expresses the desire to better oneself through associating with people who may act as role models and provide optimism. In other words, upward evaluations may both encourage and teach people how to achieve advancements (Bandura, 1997).

2.2.3 Social Comparison in Healthcare Domain

Health-related social comparison is an important subject of applied research in the study of social comparisons (Buunk and Ybema, 1997). Although social comparisons can be done intentionally, they are more typically made subconsciously, which could be due to anxiety, as fear heightens the desire to compare (Schachter, 1959). However, it has been shown that when there is stress, uncertainty, or adjustment, the demand for social comparison intensifies (Singer and Shockley, 1965; Gordon, 1966). Social comparison with equivalent representations allows for more realistic self-evaluation, but situations that contribute greatly to comparison with different representations imply that social comparison might well have added functional purposes (Hakmiller, 1966), such as self-enhancement and self-improvement. Individuals who suffer from severe medical illnesses utilize comparisons to adjust, lessen the stress, and come up with solutions (Suls and Wheeler, 2013). Patients are commonly directed to medical assistance forums or self-refer to them for transparency and exploration of their health complications, therapy, and recuperation (Friedman, 2011).

Zimbardo and Leippe (1991) proposed three different settings for a behavior change with an individual: compliance (adopting a behavior hoping to get a favorable reaction from another person but does not believe in it), identification (adopting a behavior voluntarily to maintain a stable self-defining relationship with another person), and internalization (adopting a behavior is intrinsically rewarding

as it aligns with their value system). Thus, this relates social comparison to multiple aspects, for example, human experiences and interactions, including physical ailment and healthy lifestyle (Suls and Wheeler, 2013; Friedman, 2011). Upward and downward evaluations can provide mental health benefits, for example, coping, but this is dependent on emotional and physiological variables that support absorption or difference (Lazarus and Folkman, 1984). For severe risks like surgical procedures, psychological evaluation with another peer may minimize ambiguity regarding how one can feel (Suls et al., 2000), and also because comparison with others who have encountered the threat could provide the intellectual details that individuals want to foresee the feeling (Friedman, 2011).

Social comparison with a better-performing other will have a beneficial influence on the individual undergoing comparison (Ybema and Buunk, 1995). Usually, there are two comparison dimensions: trouble severity (the severity of the difficulties one must deal with) and ways of coping adequacy (the effectiveness with which one copes with the circumstance) (Buunk and Ybema, 1997). Many social comparison studies have focused on health-related life-threatening events that are (relatively) difficult to control, such as psychological distress, infertility, etc., with breast cancer being the most prominent example (Suls and Wheeler, 2013; Friedman, 2011). In the case of pregnancy, an insufficiency of psychosocial support from one's spouse or extended community has been identified as one of the most significant determinants of prenatal anxiousness and depressive symptoms (Biaggi et al., 2016) and has postnatal anti-depressive characteristics while also reducing the unpleasant parts of the delivery encounter (Tani and Castagna, 2017). Minimal social support has indeed been attributed to an increase in depressive symptoms during maternity (Adewuya et al., 2007).

Healthcare professionals are not the only source of information for mothers during pregnancy (Phelan, 2010). They seek knowledge on pregnancy care from a variety of sources, including family, friends, and literature (Walker et al., 2018). The social positioning of a mother influences her impressions of her own beliefs, abilities, and life circumstances (Zimbardo and Leippe, 1991; Buunk and Gibbons, 2006). Women discuss personal experiences about the numerous physical and emotional adjustments they undergo with others through their maternity journey, thus the growth of parenting practices adaption could be a subject of social comparison among individuals who would be anticipating mothers (Phillips and Broderick, 2014). It is worth noting that in today's world, such comparisons are increasingly being made online, through social media (Friedman, 2011). The phenomena of social comparison via social media and its implications on expectant mothers will be addressed further in the following sections.

2.3 Social Media: A Next-Generation Medium for Social Comparison

2.3.1 Social Comparison via Social Media

People who have a high social comparison orientation undertake many social comparisons and should be more influenced by the results (Buunk and Gibbons, 2006). Social media sites like YouTube, Facebook, and Twitter have radically altered the healthcare environment in recent years (Li et al., 2018; Fried-

man, 2011). Also, social media has had a significant impact on how healthcare practitioners perform services (Friedman, 2011). Social networks can be used as a kind of "high standard of care" service, providing quick responses to patients' questions, scheduling appointments, and facilitating follow-up conversations (Li et al., 2018).

Social support was discovered to be an individual's most common use of social media for health-related purposes (Smailhodzic et al., 2016). It is the process of interacting in relationships with the goal of increasing resilience, confidence, inclusion, and competency through actual or perceived transfers of social and psychological resources (Lakey and Cohen, 2000). Four of the five types of social support have been identified as the most prominent uses of social media by individuals for health-related purposes. The four categories of support are emotional support (Mattson and Hall, 2011), esteem support (Chiu and Hsieh, 2013), information support (Setoyama et al., 2011), and network support (Bers et al., 2010). Smailhodzic et al. (2016) identified two characteristics, emotional expression and social comparison, that could not be properly classified under one of the sub-types of social support. The emotional expression refers to perhaps one chance afforded by social media for individuals to freely talk about their feelings without worrying about the instantaneous sensations or opinions of those around them (Chiu and Hsieh, 2013). Patients use social media to compare themselves to other patients to determine how "terrible" their disease is or how effective therapies are (Smailhodzic et al., 2016). Depending on the social comparison orientation and the feelings elicited, this could result in negative or positive comparisons (Chae, 2015).

Applied to pregnancy, social media empowers healthcare consumers by giving them instant access to a wealth of health-related information and a diverse range of viewpoints on health-related issues (Li et al., 2018). Motherhood, as a life changing-event, is frequently indicated as a "teachable moment" (TM) promoting lifestyle behavior change resulting in an increase in desire toward positive health behaviors and regular contact with health specialists (McBride et al., 2003; Atkinson et al., 2016). Social comparison might contribute significantly to the following themes during pregnancy: acceptance of the pregnancy, pre-conception experiences, listening to the body vs following advice, and finally, self (individuality) vs selflessness (motherhood) (Atkinson et al., 2016). Through information dissemination on pregnancy and child upbringing, the media has established the present standard for perfect parenting (Coyne et al., 2017). This allows pregnant women to use comparisons to work on enhancing their self by using downward and upward comparisons to work on improving their competencies (Chae, 2015).

2.4 Linguistics Study

According to Schoch-Ruppen et al. (2018), women who had difficulties during pregnancy and childbirth utilized very few first-person singular pronouns than women who did not have any pregnancy issues. This contradicts previous research on the usage of singular and plural first-person pronouns that claims that the use of first-person singular person pronouns (e.g., I, me) has repeatedly been

associated with poor psychological health, including higher indicators of depression (Rude et al., 2004; Stirman and Pennebaker, 2001; Brandon et al., 2008). Extreme stress has also been demonstrated to increase social connectedness and the use of plural pronouns (Schoch-Ruppen et al., 2018). The most significant contradiction to previous materials offered by Schoch-Ruppen et al. (2018) is the discovery of lower levels of psychological well-being in pregnant women that is demonstrated by a diminished commitment to collective identity (us, our) and not on the individual identity (I, mine), i.e., diminished collective commitment.

Elevated concentrations of lingual ambiguity were associated with decreased wellness and increased depression as a result (Cordova et al., 2001). Significant positive associations have been observed between negative sentiment terms and unpleasant experiences (Rude et al., 2004). Many previous studies found that unfavorable encounters or mental states (e.g., mental health abnormalities) tend to be mirrored in greater negative vocabulary use, such as words of anxiousness and despair (Rude et al., 2004; Orsillo et al., 2004; Minor et al., 2015). This is certainly applicable to pregnant women, who face a range of uncertainties and obstacles during their pregnancy (Schoch-Ruppen et al., 2018).

Until recently, a large number of questionnaires applied to evaluate psychological wellness in expectant women were designed to identify episodes of anxiousness and depressive disorder in a broad sense or throughout the postnatal phase (Caparros-Gonzalez et al., 2019; Bergant et al., 1998; Hewitt et al., 2009). Aside from concerns about the health of the baby in association with a difficult birth, particular constraints affecting expectant women are ambiguous (Pop et al., 2011). Moreover, it has been identified that when there is stress, uncertainty, or adjustment, the demand for social comparison intensifies (Buunk and Ybema, 1997). As a result, the adaptation and emotion regulation functions of social comparison may become more important in unexpected and distressing contexts (Buunk and Gibbons, 2006). Social comparison based linguistic observations specific to pregnancy is sparse which is evident from table 1.

Topic	Literature	Tilburg Pregnancy Distress Scale	INCOM Scale	Gratitude During Pregnancy	LIWC Category Observed
Pregnancy: Distress	Women's Word Use in Pregnancy: Associations With Maternal Characteristics, Prenatal Stress, and Neonatal Birth Outcome (Schoch-Ruppen et al., 2018)	Not employed	Not employed	Not employed	1. First-person singular (e.g., I, me) 2. First-person plural pronouns (e.g., we, us) 3. Positive emotion words (e.g., love, nice), 4. Negative emotion words (e.g., hate, hurt) including anxiety (e.g., nervous, tense), and sad words (e.g., cry, grief) 5. Cognitive mechanisms (e.g., think, understand), including words of cause (e.g., because, effect), discrepancy (e.g., should, would), insight (e.g., consider, know), inhibition (e.g., constrain, stop), and certainty (e.g., absolutely, sure, always, never)
	How Social Information Networks Reflect Major Life Events: Case of Childbirth (De Choudhury et al., 2014a)	Not employed	Not employed	Not employed	1. Positive Affect (PA) 2. Negative Affect (NA)
	Psychometric Evaluation of the Tilburg Pregnancy Distress Scale–Turkish Version (TPDS-T) (Ertuğrul et al., 2015)	**Significant**	Not employed	Not employed	Not employed
	Validation of the Tilburg Pregnancy Distress Scale among pregnant women in Capricorn District, South Africa (Mashegoane and Bambo, 2021)	**Good potential (Further Validation Required)**	Not employed	Not employed	Not employed
	A comparison of the Fear of Childbirth Scale with the Tilburg Pregnancy Distress Scale to identify childbirth-related fear in a sample of Dutch pregnant women: a diagnostic accuracy comparative cross-sectional study (Kuipers et al., 2020)	**Significant**	Not employed	Not employed	Not employed
	Transcultural adaptation and validation of the Tilburg Pregnancy Distress Scale (TPDS) in the Brazilian cultural context (Volpato et al., 2019)	**Significant**	Not employed	Not employed	Not employed
Social Comparison Orientation	"Am I a Better Mother Than You?": Media and 21st-Century Motherhood in the Context of the Social Comparison Theory (Chae, 2015)	Not employed	**Significant**	Not employed	Not employed
	The Role of Social Comparisons in Perceived Parental Competence, Mental Health, and Relationship Satisfaction (Caverly, 2019)	Not employed	**Significant**	Not employed	Not employed
	Direct versus Indirect Well-Being Measures: Using Partially Structured Stimuli to Evaluate Well-Being (Bajo et al., 2021)	Not employed	**Significant**	Not employed	Not employed
	Intention versus identification as determinants of adolescents' health behaviours: evidence and correlates (Rivis et al., 2011)	Not employed	**Significant**	Not employed	Not employed
	Experimental evidence of massive-scale emotional contagion through social networks (Kramer et al., 2014)	Not employed	Not employed	Not employed	1. Positive Affect (PA) 2. Negative Affect (NA)
	Social Networking Sites, Depression, and Anxiety: A Systematic Review (Seabrook et al., 2016)	Not employed	Not employed	Not employed	1. Positive emotion 2. Negative emotion 3. Anxiety 4. Anger 5. Sadness
	Mental Health Discourse on reddit: Self-Disclosure, Social Support, and Anonymity (De Choudhury and De, 2014)	Not employed	Not employed	Not employed	1. Cognitive 2. Inhibition 3. Present 4. First-person singular pronouns 5. Second third-person pronouns 6. Affect 7. Social 8. Time
Pregnancy: Gratitude	Positive prenatal well-being: conceptualising and measuring mindfulness and gratitude in pregnancy (O'Leary et al., 2016)	Not employed	Not employed	**Significant**	Not employed
	Effects of a novel positive psychological intervention on prenatal stress and well-being: A pilot randomised controlled trial (Matvienko-Sikar and Dockray, 2017)	Not employed	Not employed	**Significant**	Not employed

Table 1: Consolidation of Findings from Literature

2.5 Summary

This chapter commenced with exploring the psychology surrounding pregnancy as well as the social comparison process. Mothers engage in social comparison to self-evaluate, self-enhance, and self-improve. So far, relatively few studies have looked at pregnant women's intentions to seek and share health information via social media. Most importantly, as indicated in figure 1, there is a gap in showing cross-lagged links of mutual effect between social comparison and pregnancy using natural language studies.

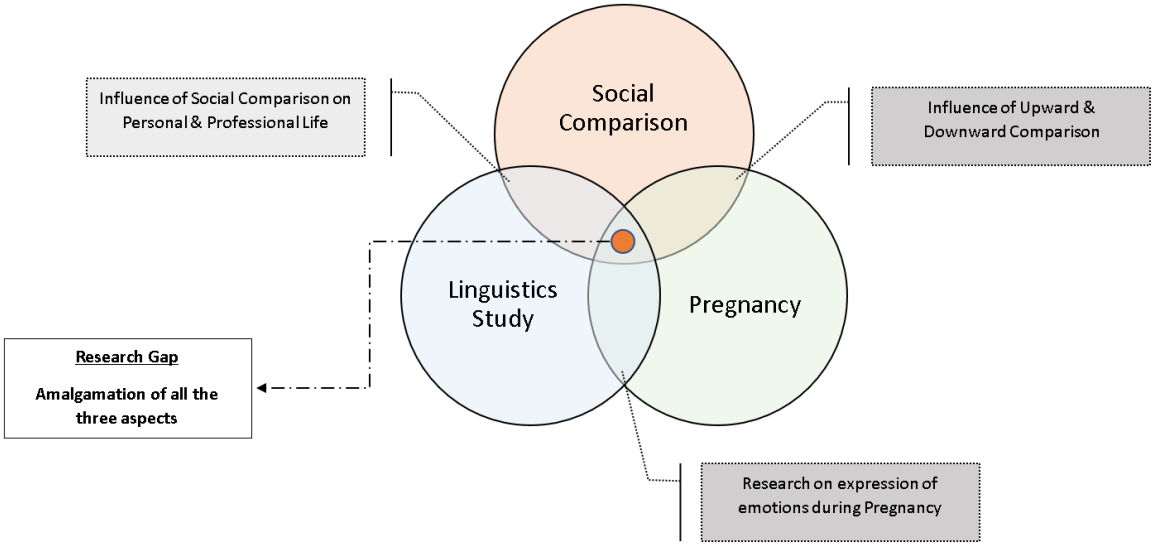


Figure 1: Research Gap Identification

3 Methodology

This chapter will outline the research methodology that has been employed to achieve the thesis' research objective. As a result, the following section will explain the research strategy selection concerning the research's main objectives.

3.1 Ethics Approval

The Human Research and Ethics Committee (HREC) of the Delft University of Technology (TU Delft) granted ethical approval for this research.

3.2 Procedure

This research project was accomplished by using a survey constructed with Qualtrics. A Qualtrics-supported URL hyperlink was presented to the participants. When participants followed the link, they were prompted with an introductory statement as well as a general overview of the research. Every respondent's right to privacy and survey research criteria were explained. After the introductory statement, a confidentiality clause declared that no sensitive information will be collected or published. The survey was categorized into three parts with the intent to gather information about the following: Expression of emotions during pregnancy, Pregnancy Support - social comparison angle, and Pregnancy Experience - an open question (with a word limit). The pregnancy experience question was intended to conduct an observational study by analyzing the natural language usage of mothers. With the consent of the respondents, a set of demographic questionnaire items was accommodated first, followed by an expression of emotion and social comparison orientation questionnaire, and finally, an open ended question requesting to elaborate on pregnancy experiences specifically for linguistics analysis.

Platform	No. of Participants
Reddit and Facebook	159
Total	**159**

Table 2: Platforms Used

In this research, the Reddit social platform was predominantly used to arrive at a comprehensive list of maternity groups. Reddit is a popular internet platform where users can publish content in the form of links or text. Users, popularly called "Redditors," can read and comment on posts and react in a discussion tree (De Choudhury and De, 2014). The postings, or material submissions, are categorized by "subreddits," or topics of concern in sub-communities, such as economics, technology, or health. This can be efficiently performed by leveraging Reddit's native subreddit search feature. By doing so, the following groups mentioned in table 16 were selected.

3.3 Participants

The complete data summary is shown in table 3. The initial sample consisted of 338 respondents. A total of 179 responses were eliminated since the open text entries were found to be lacking. Finally, 159 valid responses were gathered. The majority of the participants (58%) were currently pregnant (including first, second, and third or more than third pregnancies) and under the age of 40. This is the first pregnancy for around 28% of the participants. The preponderance of participants were Americans (48%) and Australians (20%), with others from the United Kingdom, Canada, New Zealand, Germany, Ireland, and India.

Sample Descriptions	**Summary**	**N**
Age	20-25	6
	26-30	44
	31-35	66
	36-40	30
	41-45	6
	Not mentioned	7
Gender	Female	159
	Male	0
Pregnancy Status	Currently Pregnant	92
	Currently Not Pregnant	67
Pregnancy Count	0 (Currently Pregnant)	44
	0 (Currently Not Pregnant)	3
	1 (Currently Pregnant)	21
	1 (Currently Not Pregnant)	39
	2 (Currently Pregnant)	13
	2 (Currently Not Pregnant)	14
	3 or more (Currently Pregnant)	14
	3 or more (Currently Not Pregnant)	11
Nationality	United States of America	76
	Australia	32
	Great Britain	9
	Canada	8
	The Netherlands	7
	New Zealand	5
	Germany	4
	Ireland	4
	Indian	3
	Others	11

Table 3: Sample Descriptions

3.4 Data Collection Process: Reddit Groups

Each Reddit group is administered by a single person or a group of individuals known as the administrator(s) and supervised by a group of volunteers known as the moderators. The survey link was posted in all of the groups specified in Appendix A to collect responses. Unfortunately, the account was banned and the procedure had to be restarted by creating a new profile. Direct conversations with each moderator were maintained for approval. Although that the original objective was to post the link in the groups shown in table 16, only two of the targeted groups' moderators agreed to post the survey link. As a result, moderators from women's, other pregnancy-related, and research-oriented groups were contacted, bringing the total number of groups contacted to **52** as shown in Appendix B. The moderators of **16** groups granted permission to post the survey link in their respective groups as shown in table 4.

Reddit Group	No. of Members (In Thousands)
women	117
ABCDesis	63.6
KetoBabies	17.1
beyondthebump	516
Assistance	226
nursing	372
NICUParents	9.3
BabyBumpsandBeyondAu	5.7
GestationalDiabetes	11.1
breastfeedingsupport	6.9
toddlers	312
fitpregnancy	26.1
ParentingThruTrauma	2.3
ScienceBasedParenting	45.7
Mommit	569
SampleSize	190

Table 4: Reddit Groups List

3.5 Measures

This subsection provides a detailed description of the scales used in the survey. Further, the Cronbach alpha value and a principal component analysis are also determined for each scale. Principal Component Analysis is a non-parametric method for obtaining insights from large amounts of heterogeneous data specifically in predictive models and exploratory data analysis. In form of a complimentary set of scoring plots, it is intended to identify the predominant characteristics of the matrix. Finally, the internal consistency of the scales used in this study is determined using Cronbach alpha.

3.5.1 Expression of Emotions

As mentioned in section 3.2, the investigation was driven by three main sections. The first section was intended to provide more information on emotional expression throughout the pregnancy journey. The Gratitude During Pregnancy Scale and the Tilburg Pregnancy Distress Scale were employed to represent this section.

Distress Scale

The Tilburg Pregnancy Distress Scale (TPDS) is used in this study to assess Negative Affect with a sub-scale composed of eleven items (items: 3, 5, 6, 7, 9, 10, 11, 12, 13, 14, 16) related to pregnancy and childbirth, anxiety, fear, and experiences and worries about post pregnancy alteration, whereas the Social sub-scale is comprised of five items (Items: 1, 2, 4, 8, 15) linked to assistance from partner throughout their pregnancy (Pop et al., 2011). Each item on the scale requires participants to choose one of four possibilities (from 0, frequently, to 3, rarely or never). This results in an overall negative impact total score: the higher the aggregate, the more likely the participant feels distressed about pregnancy. Table 5 illustrates a factor analysis of the scale, which, as stated by Pop et al. (2011), reveals the presence of two factors.

	1	**2**	Uniqueness
1 Negative Affect			
Q3	0.625		0.609
Q5	0.853		0.293
Q6	0.676		0.561
Q7	0.537		0.719
Q9	0.502		0.760
Q10	0.641		0.606
Q11	0.573		0.651
Q12	0.795		0.294
Q13	0.741		0.447
Q14	0.577		0.550
Q16	*0.375*		0.853
2 Social			
Q1		0.569	0.659
Q2		0.872	0.233
Q4		0.820	0.360
Q8		0.683	0.490
Q15		0.663	0.519

Table 5: Factor Loadings for Principal Component Analysis: Tilburg Pregnancy Distress Scale

The Tilburg Pregnancy Distress Scale is typically split into two parts: negative affect and social. The findings of the principal component analysis validate this subdivision, as indicated in table 5. The Cronbach Alpha (α) values for the Tilburg Pregnancy Distress Scale were reliable in this investigation: Overall Pregnancy Distress (.84), Negative Affect (.85), and Social (.78).

Gratitude Scale

The GDP (Gratitude During Pregnancy) scale has eighteen items that can be used to assess how appreciative respondents are for various elements and events of their pregnancy journey and daily life. The GDP (Gratitude During Pregnancy) scale has four discrete components: General Gratitude (Items: 1 - 7), Physical Changes (Items: 12, 14, 15, 16, 17), Antenatal Care (Questions: 8, 9, 10, 13), and Social Life Support (Items: 11, 18). Gratitude-related techniques, such as contemplating on and recognizing traits for which one is grateful, have positive and protracted effects on health and wellness (O'Leary et al., 2016). The first seven items on the scale are assessed on a five-point Likert scale ranging from 1 (not at all) to 5 (extremely). The succeeding items are rated on a five-point scale ranging from 1 (not at all grateful) to 5 (extremely grateful). Table 6 illustrates a factor analysis of the scale, which, as stated by O'Leary et al. (2016), reveals the presence of four factors.

	1	**2**	**3**	**4**	Uniqueness
1 Physical Changes					
Q12	0.783				0.360
Q14	0.701				0.562
Q15	0.722		*0.290*		0.417
Q16	0.823				0.340
Q17	0.691				0.473
2 General Gratitude					
Q1		0.861			0.318
Q2		0.769			0.481
Q3	0.533	*0.371*			0.430
Q4		0.831			0.330
Q5	0.730				0.398
Q6		*0.282*		*0.287*	0.646
Q7		0.625			0.406
3 Antenatal Care					
Q8			0.852		0.310
Q9			0.834		0.302
Q10			0.758		0.319
Q13			0.710		0.409
4 Social Life Support					
Q18				0.865	0.252
Q11				0.853	0.252

Table 6: Factor Loadings for Principal Component Analysis: Gratitude During Pregnancy Scale

The Gratitude During Pregnancy Scale is typically split into four parts: general gratitude, physical changes, antenatal care, and social life support. However, as shown in table 6 and further as a path diagram in appendix E, the results of the principal component analysis do not validate this subdivision that was observed by O'Leary et al. (2016). The following items: 3, 5 and 6 were not loaded under the general gratitude component in the matrix. The internal consistency in the present study was examined using Cronbach's alpha (α) and was found to be reliable for Overall Gratitude (.85), Physical Changes (.81), and Social Life and Support (.74). However, Cronbach's alpha for General Gratitude (.77), and and Antenatal Care (.78) was found to be unreliable.

3.5.2 Social Comparison

Several individuals make a comparison of themselves to someone else on a regular basis. Individuals might, for instance, evaluate how they think, one's ideas, own talents, or their circumstances to that of others (Buunk and Ybema, 1997). The social comparison orientation measure is designed to determine how frequently individuals evaluate self to others (Gibbons and Buunk, 1999). Thus, the objective of the second section of the survey is to measure the social comparison orientation of the participants.

Social Comparison Orientation Scale

Iowa-Netherlands Comparison Orientation Measure (INCOM), which is congruent with Festinger's original social comparison theory from 1954, comprises 11 items meant to examine how often people may attempt evaluating oneself to specific other individuals, including ability and opinion-based comparisons (Gibbons and Buunk, 1999). There are two categories of social comparisons that are distinctive in their inherent structure: comparisons of ability (Items 1 - 6) and comparisons of opinions (Items 7 - 11). The INCOM metric comprises a 5-point Likert scale on which participants could select one value ranging from strongly disagree (1) to strongly agree (5). Table 7 illustrates a factor analysis of the scale, which, as stated by Gibbons and Buunk (1999), reveals the presence of two factors.

	1	2	Uniqueness
1 Comparison of Abilities			
Q1	0.574		0.661
Q2	0.819		0.371
Q3	0.765		0.404
Q4	0.773		0.420
Q5	0.822		0.358
Q6	0.694		0.498
2 Comparison of Opinions			
Q7		0.686	0.564
Q8		0.929	0.196
Q9		0.859	0.245
Q10		0.548	0.514
Q11	0.408		0.806

Table 7: Factor Loadings for Principal Component Analysis: Social Comparison Orientation Scale (INCOM)

The Iowa-Netherlands Comparison Orientation Measure is typically split into two parts: comparison of abilities, and comparison of opinions. However, as shown in table 7 and further as a path diagram in appendix D, the results of the principal component analysis do not validate this subdivision that was observed by Gibbons and Buunk (1999) as item 11 was not loaded under the comparison of opinions component in the matrix. The internal consistency in the present study was examined using Cronbach's alpha (α) and was found to be reliable for Overall Comparison (.81), and Comparison of Abilities (.84). However, Cronbach's alpha for Comparison of Opinions (.70) was found to be unreliable.

3.5.3 Linguistics Study

People's common parlance can disclose crucial elements of social and behavioral life (Pennebaker, 1997). The experience of complications during pregnancy may influence a mother's state of mind and therefore, also her choice of words. Thus, the third and final segment i.e., the open-ended question, was mainly exploratory in nature since there are hardly any studies on associations between word use, pregnancy-related characteristics, and social comparison and so enabling to base hypotheses on.

Pregnancy Experience: Open-Ended Question

To enhance the reliability of the results, participants were asked to write down their pregnant experiences in a minimum of 550 characters (78 - 138 words), which is in line with prior research (Schachter, 1959). The linguistic features expressed in the text were studied by organizing the textual data in several semantic categories to understand the characteristics of self-disclosure in the survey using the Linguistic Inquiry and Word Count (LIWC) software package (Pennebaker and Booth, 2007). The

LIWC is a text processing software package that determines the share of words in the text message that belong to any one of the selected categories as listed in table 8.

Category	Abbrev.	Description/Examples
Summary Variables		
Analytical thinking	Analytic	Metric of logical, formal thinking
Clout	Clout	Language of leadership, status
Authentic	Authentic	Perceived honesty, genuineness
Emotional tone	Tone	Degree or positive (negative) tone
Words per sentence	WPS	Average words per sentence
Big words	BigWords	Percent words 7 letters or longer
Dictionary words	Dic	Percent words captured by LIWC
Linguistic Dimensions	Linguistic	
Total pronouns	Pronoun	I, you, that, it
Personal pronouns	Ppron	I, you, my, me
1st person singular	I	I, me, my, myself
1st person plural	We	we, our, us, lets
3rd person singular	Shehe	he, she, her, his
3rd person plural	They	they, their, them, themsel*
Negations	Negate	not, no, never, nothing
Psychological Processes		
Affect	Affect	good, well, new, love
Positive tone	Tone_pos	good, well, new, love
Negative tone	Tone_neg	bad, wrong, too much, hate
Emotion	Emotion	good, love, happy, hope
Positive emotion	Emo_pos	good, love, happy, hope
Negative emotion	Emo_neg	bad, hate, hurt, tired
Anxiety	Emo_anx	worry, fear, afraid, nervous
Anger	Emo_anger	hate, mad, angry, frustr*
Sadness	Emo_sad	:(, sad, disappoint*, cry
Social referents	Focrefs	you, we, he, she
Family	Family	parent*, mother*, father*, baby
Friends	Friend	friend*, boyfriend*, girlfriend*, dude
Female references	Female	she, her, girl, woman
Male references	Male	he, his, him, man
Expanded Dictionary		
Technology	Tech	car, phone, comput*, email*
Physical	Physical	medic*, food*, patients, eye*
Health	Health	medic*, patients, physician*, health
Illness	Illness	hospital*, cancer*, sick, pain
Wellness	Wellness	healthy, gym*, supported, diet
Mental health	Mental	mental health, depressed, suicid*, trauma*

Table 8: Selected Semantic Categories in LIWC (Pennebaker and Booth, 2007; Pennebaker, 1999; Schoch-Ruppen et al., 2018; De Choudhury and De, 2014)

The collective representations or themes of the participants' cumulative text entries were found using a topic modeling technique termed the *meaning extraction method*, as shown in figure 2. The least common terms are contrasted by having color-coded in blue. It was discovered that people discussing their pregnancy experiences and social media usage regularly mentioned *pregnancy, media, social, people, baby, experience, friends, information, support, etc.*

Figure 2: Word Cloud: Meaning Extraction

The *narrative arc* analysis in LIWC-22 is a development of earlier work that demonstrated how communicators frequently experience a distinctive "transition" of language choices while building one's narration (Boyd et al., 2020). The presentation of personal narratives supports details about the individuals, struggle, resolutions, and several other narrative elements. According to Boyd et al. (2020), the communicator starts by employing a lot of *"staging"* language, which consists of words that describe nouns and their relationships to one another. After having gone through this process, the communicator starts using more terms that indicate activity and terms that indicate a collective awareness of who is taking part in those activities, how those actions are occurring, etc., which expresses *"plot progression"*. The crucial section that depicts emotional problems is the concluding one, which is the *"cognitive tension"*. It does so, for instance, by explaining challenges, differences of opinion, and ambiguities. The narrative arc analysis of the entire text entries represented in figure 3 was carried out using LIWC-22. The entire text entry is divided into five smaller segments to understand the narrative better. In figure 3, the horizontal axis represents the segments of the textual data and the vertical axis represents the corresponding narrativity scores for staging, plot progression, and cognitive tension. It was obvious that the text's later segments contained greater word usage that reflected cognitive tension than its earlier sections. The participants' word choice in the initial segments was more focused on staging and plot progression.

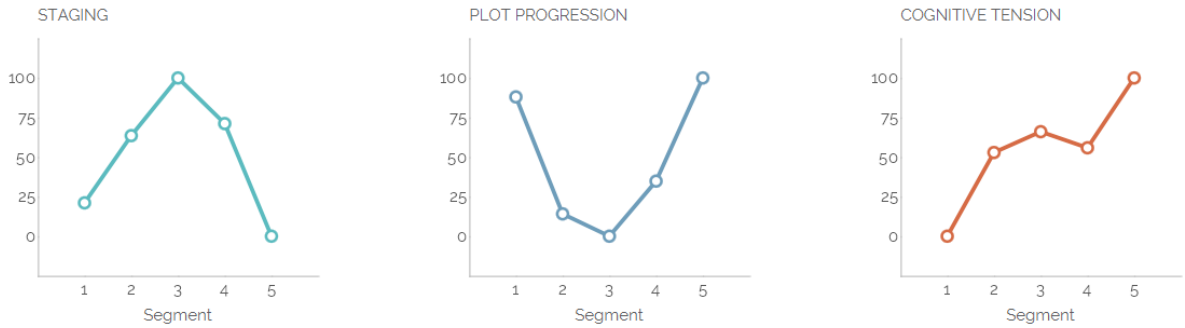


Figure 3: Narrative Arc Analysis

The narrative arc analysis is explained with two examples as shown in figure 4 and figure 5. To better comprehend the structure underlying each text input, a selection of the relevant LIWC categories in this research study are signified by colored words. An example of a text entry with a higher narrativity score is shown in figure 4. Although it doesn't inherently mean a "better" text, it does indicate that the participant considered trying methods for organizing and communicating details. The participant starts by using a lot of staging and plot progression language, but in the later stages switches to words that convey cognitive tension.

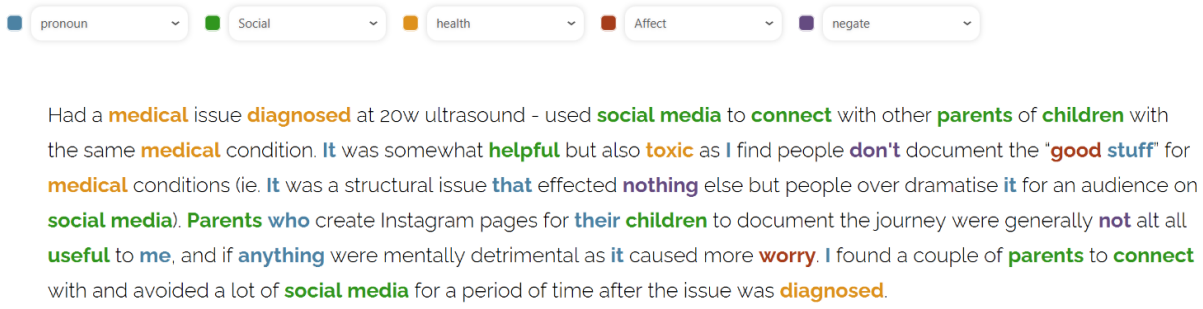


Figure 4: Text Annotation: An Example With High Value of Arc of Narrative

The text in figure 5, in contrast, has a lower narrativity score, indicating that the participant did not focus much on the structure when expressing the details.

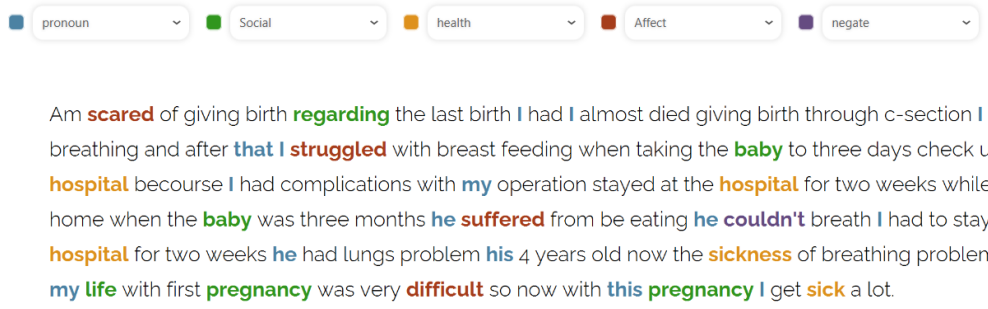


Figure 5: Text Annotation: An Example With Low Value of Arc of Narrative

3.5.4 LIWC summary

The linguistic characteristics associated with each selected category are outlined in this subsection. LIWC-22 was used to analyze the participants' responses to the open-ended question. Within every linguistic classification, LIWC-22 contains an in-built psychological assessment to compile a wide range of texts that generally depict how different words are used by standard individuals on a daily basis. These classifications include: Summary Variables, Linguistic Dimensions, Psychological Processes, and Expanded Dictionary. The software splits the responses and separates them into their component groups. A proportion of the total number of words will also be assigned to each word. The word density comparisons for the survey participants and the LIWC-22 word density norms (Boyd et al., 2022) for the 35 categories that were chosen for this research study are shown in table 9. The majority of LIWC output variables are estimations based on a script's total word count. The only attributes that are not completely transparent in the LIWC-22 results are the summary variables. Out of the 35 chosen categories, four summary measures such as analytical thinking, clout, authenticity, and emotional tone are determined using an internal algorithm within LIWC.

Category	Abbrev.	Description/Examples	Word Density of the Sample	Word Density of LIWC2022 Norms
Summary Variables				
Analytical thinking	Analytic	Metric of logical, formal thinking	41.0	49.6
Clout	Clout	Language of leadership, status	15.8	49.6
Authentic	Authentic	Perceived honesty, genuineness	79.0	50
Emotional tone	Tone	Degree or positive (negative) tone	37.1	48.2
Words per sentence	WPS	Average words per sentence	20.9	17.2
Big words	BigWords	Percent words 7 letters or longer	21.1	17.2
Dictionary words	Dic	Percent words captured by LIWC	91.3	88
Linguistic Dimensions	Linguistic		71.7	69.6
Total pronouns	Pronoun	I, you, that, it	14.1	14.8
Personal pronouns	Ppron	I, you, my, me	9.7	9.9
1st person singular	I	I, me, my, myself	8.3	4.3
1st person plural	We	we, our, us, lets	0.4	0.9
3rd person singular	Shehe	he, she, her, his	0.2	2
3rd person plural	They	they, their, them, themsel*	0.4	0.9
Negations	Negate	not, no, never, nothing	1.6	1.6
Psychological Processes				
Affect	Affect	good, well, new, love	5.8	5.4
Positive tone	Tone_pos	good, well, new, love	3.3	3.5
Negative tone	Tone_neg	bad, wrong, too much, hate	2.4	1.5
Emotion	Emotion	good, love, happy, hope	2.3	1.9
Positive emotion	Emo_pos	good, love, happy, hope	0.7	1.1
Negative emotion	Emo_neg	bad, hate, hurt, tired	1.4	0.7
Anxiety	Emo_anx	worry, fear, afraid, nervous	0.8	0.1
Anger	Emo_anger	hate, mad, angry, frustr*	0.1	0.1
Sadness	Emo_sad	:(, sad, disappoint*, cry	0.1	0.1
Social referents	Focrefs	you, we, he, she	6.8	8.1
Family	Family	parent*, mother*, father*, baby	3.4	0.4
Friends	Friend	friend*, boyfriend*, girlfriend*, dude	0.2	0.2
Female references	Female	she, her, girl, woman	0.6	1.3
Male references	Male	he, his, him, man	0.3	1.5
Expanded Dictionary				
Technology	Tech	car, phone, comput*, email*	2.3	0.3
Physical	Physical	medic*, food*, patients, eye*	5.4	2.4
Health	Health	medic*, patients, physician*, health	4.6	0.7
Illness	Illness	hospital*, cancer*, sick, pain	0.9	0.2
Wellness	Wellness	healthy, gym*, supported, diet	0.3	0
Mental health	Mental	mental health, depressed, suicid*, trauma*	0.2	0

Table 9: LIWC Selected Categories & Word Density Patterns

4 Results

This chapter summarizes the major findings of the study, which looked at relationships between social comparison, emotional expression, and linguistic patterns in pregnant women. The descriptives and correlations are presented in the first section. The findings of the analyses are then provided in the second section. Further, in the third section the responses of the participants are examined. The findings are presented in a consolidated perspective in the final section so that they can be compared with prior studies.

4.1 Correlations and Overall Distributions

The descriptive statistics and a correlation matrix, including arithmetic means and standard deviations, are included in table 10. The correlation matrix accounts for several factors: *General Gratitude, Physical Changes, Antenatal Care, Social Life & Support (Gratitude Scale), Opinions & Abilities (INCOM Scale)*, and *Negative Affect & Social (Tilburg Scale)*. Pearson's product-moment correlation, often known as *Pearson's r*, is used to calculate the correlations in the table. Pearson's r examines the linear relationship between two data sets.

The individual components present within a scale significantly correlate with each other i.e., among *General Gratitude, Physical Changes, Antenatal Care, Social Life & Support* in the Gratitude During Pregnancy Scale, *Abilities & Opinions* in INCOM Scale and *Negative affect & Social* in Tilburg Pregnancy Distress Scale. From the correlation analysis, there existed a moderate positive correlation between *Opinions* and *Antenatal Care* and *Social (Gratitude Scale)*. Also, there existed a highly significant positive correlation between *Abilities* and *Negative Affect*. This is an indicator that risk evaluations by seeking opinions or comparing abilities through various social networks are correlated with emotions and biological stress response, which is connected to persistent metabolic excitation tendencies (Maier et al., 2003).

Additionally, the analysis revealed a significant positive correlation between *Social (Tilburg Scale)* and *Abilities*. The Tilburg scale's social component centres on partner involvement. Maternal gatekeeping leads to controlling the partner's engagement in family and childcare activities by "guarding" the organization of all activities, and executing activities themselves (Allen and Hawkins, 1999). Maternal gatekeeping is directly related to intensive mothering practice, which includes carrying out daily tasks and making an effort to become a better mother. This is a natural instinct to defend the motherhood identity (Liss et al., 2013). Furthermore, there existed a significant negative correlation of *Negative affect* with *Physical Changes*. This is an indicator that excessive stress may occur during the prenatal stage from attempting to adapt to significant physical and mental transformations (La Marca-Ghaemmaghami et al., 2017). Some women may acquire adverse psychological states such as depression or anxiety. Perinatal stressful situations may persist all through pregnancy and into the

postnatal phase if not effectively handled (Grant et al., 2008).

Partial Answer to RQ

From the correlations drawn between various scales, there existed a moderate positive correlation between *Opinions* with *Antenatal Care*, and *Social (Gratitude Scale)* whereas there existed a highly significant positive correlation between *Abilities* with *Negative Affect*. This shows that the social positioning of a mother influences her impressions of her own beliefs, abilities, and life circumstances. Further, the positive correlation validates the findings that insufficiency of social and psychological support from one's spouse or extended community has been identified as one of the most significant determinants of prenatal anxiousness and depressive symptoms which was also observed by Biaggi et al. (2016). This partially answers the main research question that aimed to explore the patterns in social and psychological changes of women throughout pregnancy.

Variable	Mean	Standard Deviation		1	2	3	4	5	6	7	8
1. General Gratitude	28.189	2.908	Pearson's r	–							
			p-value	–							
2. Physical Changes	14.384	4.203	Pearson's r	0.444***	–						
			p-value	<.001	–						
3. Antenatal Care	19.126	1.664	Pearson's r	0.301***	0.186*	–					
			p-value	<.001	0.019	–					
4. Social Support	8.277	1.687	Pearson's r	0.410***	0.306***	0.294***	–				
			p-value	< .001	< .001	< .001	–				
5. Abilities	19.541	4.801	Pearson's r	−0.144	−0.128	0.078	−0.109	–			
			p-value	0.071	0.109	0.330	0.171	–			
6. Opinions	19.774	2.781	Pearson's r	0.020	0.006	0.159*	0.177*	0.336**	–		
			p-value	0.801	0.942	0.045	0.026	< .001	–		
7. Negative affect	13.969	7.126	Pearson's r	-0.182*	-0.221**	0.116	-0.167*	0.366***	0.101	–	
			p-value	0.021	0.005	0.147	0.035	< .001	0.204	–	
8. Social	5.000	3.366	Pearson's r	-0.426***	-0.425***	-0.206**	-0.536***	0.232*	−0.066	0.245**	–
			p-value	< .001	< .001	0.009	< .001	0.003	0.407	0.002	–

* p < .05, ** p < .01, *** p < .001

Table 10: Descriptive Statistics and Correlation Matrix

4.2 Correlation Analysis & Significance Test

The results of the correlational and linear regression analyses are discussed in detail in this subsection. JASP was used for the correlation analysis and significance tests, with the *35 LIWC categories* chosen in subsection 3.5.3 as the dependent variables and *Comparison of Abilities, Negative Affect,* and *Social Support (Gratitude Scale)* as the independent variable. The results are shown in tables 11, 12, and 13. Each of the LIWC categories' dependent variables is listed in the first column. The findings of the correlation between segments with low and high scores for each dependent variable are highlighted in the second and third columns. Finally, columns 4, 5, and 6 highlight the results of linear regression analysis ("t" value) to determine whether there is a significant difference between the means of two data sets from the same population, the values of two groups are compared using the value of "t".

4.2.1 Comparison of Abilities

Correlational analysis and significance test as shown in table 11 were carried out between the comparison of abilities and the 35 LIWC categories that were chosen in subsection 3.5.3 using JASP. The comparison of abilities construct was the independent variable, while the 35 LIWC categories were the dependent variables.

Correlation Analysis

Based on the participants' score and word density for each category from LIWC2022, two sub-categories of the correlation analysis results as shown in table 11 were highlighted: *Low Comparison of Abilities* and *High Comparison of Abilities.*

The variable *analytic* has the highest significant positive correlation with *low comparison of abilities* ($r = -0.425$, $p < 0.001$).

The words under categories *anxiety* ($r = 0.323$, $p < 0.01$), *authentic* ($r = 0.309$, $p < 0.01$), *dictionary words* ($r = 0.303$, $p < 0.01$), and *emotion* ($r = 0.298$, $p < 0.01$) have moderate correlations with low comparison of abilities.

The categories *negative emotion* ($r = 0.341$, $p < 0.01$), *negative tone* ($r = 0.339$, $p < 0.01$), and *emotion* ($r = 0.293$, $p < 0.01$) have moderate correlations with high comparison of abilities. This is a finding similar to that of a prior study by De Choudhury and De (2014). Additionally, it supports the theoretical foundations put forward by Suls and Wheeler (2013) who explain that social comparison phenomena are extremely relevant for how people perceive potential health hazards, understands the effects on their health, decides whether or not to seek medical attention for discomfort, and cope with severe illness and functional limitations.

The categories: *linguistic dimensions* ($r = 0.277$, $p < 0.05$), *negative emotion* ($r = 0.276$, $p < 0.05$), *total pronouns* ($r = 0.253$, $p < 0.05$), *personal pronouns* ($r = 0.251$, $p < 0.05$), and *I* ($r = 0.242$, $p < 0.01$) showed rather weak correlations with low comparison of abilities.

The categories: *WPS ($r = 0.161$, $p < 0.05$)*, and *illness ($r = 0.323$, $p < 0.01$)* showed rather weak correlations with high comparison of abilities. Also, *emotional tone ($r = 0.161$, $p < 0.05$)*, showed a weak negative correlation with high comparison of abilities.

Significance Test

Table 11 lists the results of linear regression analysis between the 35 LIWC categories and the comparison of abilities construct in the column designated "t".

The majority of the results in table 11 is not significant. However, the following nine categories: *negative emotion, emotion, wellness, authentic, emotional tone, dictionary words, linguistic dimensions, negative tone*, and *anxiety* are significant. *Negative emotion* is the most significant with $t = 3.871$, and $p < 0.001$. This is followed by *emotion* with $t = 2.805$, and $p = 0.006$, *authentic* with $t = 2.855$, and $p = 0.005$, *emotional tone* with $t = -2.629$, and $p = 0.009$, and finally, *wellness* with $t = -2.845$, and $p = 0.005$.

Answer to SQ2

SQ2 aimed to explore the influence of social comparison on pregnant women throughout their pregnancy. The categories negative emotion, emotion, wellness, authentic, emotional tone, dictionary words, linguistic dimensions, negative tone, and anxiety are all indicators of people who place a great value on the comparison. For severe risks like surgical procedures, psychological evaluation with other peers may minimize ambiguity regarding how one can feel, and also because comparison with others who have encountered the threat could provide the intellectual details that individuals want to foresee the feeling (Friedman, 2011). This can be further backed by the observation that pregnant women seek emotional support by sharing their authentic experiences and expressing health concerns (O'Leary et al., 2016).

	Comparison of Abilities		t	p	95% CI	
	Low	**High**			**Lower**	**Upper**
1 Analytic	-0.425***	0.072	-1.246	0.215	-1.335	0.302
2 Clout	-0.168	-0.052	-1.334	0.184	-1.150	0.223
3 Authentic	0.309**	-0.012	2.855	0.005**	0.288	1.579
4 Tone	-0.143	-0.252*	-2.629	0.009**	-2.364	-0.336
5 WPS	-0.143	0.261*	1.542	0.125	-0.092	0.750
6 BigWords	0.018	0.063	-0.519	0.605	-0.209	0.122
7 Dic	0.303**	-0.044	2.356	0.020*	0.021	0.245
8 Linguistic	0.277*	-0.045	2.242	0.026*	0.026	0.413
9 Pronoun	0.253*	-0.089	1.550	0.123	-0.027	0.223
10 Ppron	0.251*	-0.099	1.328	0.186	-0.033	0.169
11 I	0.242*	-0.101	1.153	0.251	-0.042	0.159
12 We	0.086	-0.125	-0.031	0.975	-0.032	0.031
13 Shehe	0.018	0.108	1.417	0.159	-0.006	0.034
14 They	0.057	0.003	0.618	0.538	-0.014	0.026
15 Negate	0.166	-0.062	1.249	0.213	-0.016	0.073
16 Affect	0.083	0.218	0.311	0.756	-0.067	0.093
17 Tone_pos	-0.082	-0.024	-1.911	0.058	-0.123	0.002
18 Tone_neg	0.200	0.339**	2.612	0.010*	0.018	0.131
19 Emotion	0.298**	0.293**	2.805	0.006**	0.022	0.129
20 Emo_pos	0.136	0.077	-0.191	0.848	-0.031	0.025
21 Emo_neg	0.276*	0.341**	3.871	<0.001***	0.039	0.121
22 Emo_anx	0.323**	0.018	2.493	0.014*	0.008	0.069
23 Emo_anger	-0.122	0.138	-0.584	0.560	-0.011	0.006
24 Emo_sad	-0.050	0.082	1.891	0.060	-0.0004	0.020
25 Socrefs	-0.049	-0.149	-0.891	0.374	-0.148	0.056
26 Family	-0.075	0.004	-0.365	0.715	-0.077	0.053
27 Friend	-0.105	-0.181	-1.290	0.199	-0.028	0.006
28 Female	-0.103	-0.03	0.271	0.787	-0.025	0.033
29 Male	0.162	0.076	1.209	0.228	-0.009	0.036
30 Tech	0.0002	-0.206	-0.530	0.597	-0.079	0.045
31 Physical	-0.178	0.118	-0.451	0.652	-0.113	0.071
32 Health	-0.146	0.085	-0.710	0.479	-0.113	0.053
33 Illness	0.050	0.237*	1.358	0.176	-0.011	0.058
34 Wellness	-0.202	-0.177	-2.845	0.005**	-0.046	-0.008
35 Mental	-0.094	0.081	0.011	0.991	-0.022	0.022

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 11: Comparison of Abilities & LIWC Categories:
Correlations & Significance Test

4.2.2 Negative Affect

Correlational analysis as shown in table 12 was carried out between negative affect and the 35 LIWC categories that were chosen in subsection 3.5.3 using JASP. The negative affect construct was the independent variable, while the 35 LIWC categories were the dependent variables.

Correlation Analysis

Based on the participants' score and word density for each category from LIWC2022, two sub-categories of the correlation analysis results as shown in table 12 were highlighted: *Low Negative Affect* and *High Negative Affect*.

The variable *negative tone* ($r = 0.378$, $p < 0.001$) has the highest significant positive correlation with high negative affect.

The variable *anger* ($r = 0.298$, $p < 0.01$) has a moderate correlation with high negative affect. Furthermore, the variable *emotional tone* ($r = -0.318$, $p < 0.01$) has a moderate negative correlation with high negative affect.

The categories: *linguistic dimensions* ($r = 0.248$, $p < 0.05$), and *dictionary words* ($r = 0.220$, $p < 0.01$) showed rather weak correlations with low negative affect.

The categories: *mental* ($r = 0.252$, $p < 0.05$), *shehe* ($r = 0.230$, $p < 0.01$), and *analytic* ($r = 0.229$, $p < 0.05$) showed rather weak correlations with high negative affect.

Significance Test

Table 12 lists the results of linear regression analysis between the 35 LIWC categories and the comparison of abilities construct in the column designated "t".

The majority of the results in table 12 is not significant. However, the following eight categories: *negative tone, WPS, emotional tone, dictionary words, linguistic dimensions, shehe, negative emotion*, and *anger* are significant. *Negative tone* is the most significant with $t = 3.666$, and $p < 0.001$. This is followed by *WPS* with $t = 2.791$, and $p = 0.006$.

Answer to SQ1

SQ1 aimed to explore women's expression of emotions about their pregnancy. The categories negative tone, WPS, emotional tone, dictionary words, linguistic dimensions, shehe, negative emotion and anger are all indicators of high negative affect. As observed by Schoch-Ruppen et al. (2018), first-person singular pronouns were not significant. In this research study, third-person singular pronouns (he, she, her, his) were found to be significant. However, Schoch-Ruppen et al. (2018) reported the significance of first-person plural pronouns. Further, the present study validates the association of negative emotion, linguistic dimensions, and WPS with negative affect as observed by Schoch-Ruppen et al. (2018).

	Negative Affect		t	p	95% CI	
	Low	**High**			**Lower**	**Upper**
1 Analytic	-0.192	0.229*	0.740	0.461	-0.346	0.761
2 Clout	-0.087	0.069	0.265	0.791	-0.403	0.527
3 Authentic	0.192	0.067	0.723	0.470	-0.282	0.608
4 Tone	0.113	-0.318**	-2.443	0.016*	-1.533	-0.162
5 WPS	0.154	0.187	2.791	0.006**	0.115	0.673
6 BigWords	-0.097	0.165	-0.278	0.782	-0.127	0.096
7 Dic	0.220*	0.090	2.470	0.015*	0.019	0.169
8 Linguistic	0.248*	-0.023	2.286	0.024*	0.020	0.281
9 Pronoun	0.103	-0.109	-1.192	0.235	-0.135	0.033
10 Ppron	0.126	-0.019	-0.397	0.692	-0.082	0.055
11 I	0.081	-0.060	-1.142	0.255	-0.106	0.028
12 We	0.055	-0.139	0.195	0.846	-0.019	0.023
13 Shehe	-0.013	0.230*	2.260	0.025*	0.002	0.028
14 They	0.207	0.044	0.615	0.539	-0.009	0.018
15 Negate	0.045	-0.168	0.626	0.532	-0.021	0.040
16 Affect	0.139	0.143	1.803	0.073	-0.005	0.102
17 Tone_pos	0.169	-0.160	-0.941	0.348	-0.063	0.022
18 Tone_neg	0.018	0.378***	3.668	<0.001***	0.032	0.107
19 Emotion	-0.023	0.128	1.321	0.189	-0.012	0.061
20 Emo_pos	0.085	-0.078	-1.094	0.276	-0.029	0.008
21 Emo_neg	-0.058	0.219	2.517	0.013*	0.008	0.064
22 Emo_anx	0.061	0.101	1.615	0.108	-0.004	0.038
23 Emo_anger	-0.155	0.298**	2.524	0.013*	0.002	0.013
24 Emo_sad	0.168	0.022	1.590	0.114	-0.001	0.012
25 Socrefs	-0.032	0.082	0.262	0.794	-0.060	0.078
26 Family	-0.186	-0.003	0.103	0.918	-0.042	0.046
27 Friend	0.031	0.005	-0.303	0.762	-0.013	0.010
28 Female	-0.044	0.065	1.057	0.292	-0.009	0.030
29 Male	-0.015	0.182	1.716	0.088	-0.002	0.028
30 Tech	-0.047	-0.122	-0.326	0.745	-0.049	0.035
31 Physical	0.094	0.068	0.165	0.869	-0.057	0.067
32 Health	0.076	0.022	-0.243	0.808	-0.063	0.049
33 Illness	-0.041	0.076	0.139	0.889	-0.022	0.025
34 Wellness	-0.068	0.012	1.099	0.274	-0.006	0.020
35 Mental	-0.024	0.252*	0.077	0.939	-0.014	0.015

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 12: Negative Affect & LIWC Categories: Correlations & Significance Test

4.2.3 Social Support

Correlational analysis as shown in table 13 was carried out between social support and the 35 LIWC categories that were chosen in subsection 3.5.3 using JASP. The social support construct was the independent variable, while the 35 LIWC categories were the dependent variables.

Correlation Analysis

Based on the participants' score and word density for each category from LIWC2022, the correlation analysis as shown in table 13 resulted for *social support*

The variable *negative tone (r = -0.227, $p < 0.01$)* has a moderate negative correlation with social support .

The categories: *sadness (r = -0.158, $p < 0.05$), anger (r = -0.164, $p < 0.01$), emotion (r = -0.181, $p < 0.01$)*, and *negative emotion (r = -0.196, $p < 0.01$)* showed rather weak negative correlations with high comparison of abilities.

Significance Test

Table 12 lists the results of linear regression analysis between the 35 LIWC categories and the comparison of abilities construct in the column designated "t".

The majority of the results in table 12 is not significant. However, the following five categories: *negative emotion, emotion, negative tone, anger*, and *sadness* are significant. *Negative tone* is the most significant with t = *-2.916*, and p = *0.004*. This is followed by *sadness* with t = *-2.001*, and p = *0.047*, *anger* with t = *-2.087*, and p = *0.038*, *emotion* with t = *-2.308*, and p = *0.022*, and finally, *negative emotion* with t = *-2.505*, and p = *0.013*.

	Social Support	t	p	95% CI	
				Lower	Upper
1 Analytic	0.093	1.171	0.243	-0.949	3.713
2 Clout	0.112	1.409	0.161	-0.559	3.344
3 Authentic	-0.131	-1.659	0.099	-3.436	0.299
4 Tone	0.118	1.489	0.139	-0.721	5.136
5 WPS	0.082	1.028	0.306	-0.577	1.829
6 BigWords	0.083	1.046	0.297	-0.221	0.719
7 Dic	-0.011	-0.144	0.886	-0.460	0.299
8 Linguistic	-0.131	-1.657	0.099	-1.019	0.089
9 Pronoun	-0.126	-1.589	0.114	-0.641	0.069
10 Ppron	-0.107	-1.351	0.178	-0.483	0.091
11 I	-0.145	-1.834	0.069	-0.546	0.020
12 We	0.031	0.383	0.702	-0.072	0.106
13 Shehe	-0.037	-0.468	0.640	-0.070	0.043
14 They	0.039	0.483	0.630	-0.043	0.071
15 Negate	-0.134	-1.696	0.092	-0.234	0.018
16 Affect	-0.141	-1.791	0.075	-0.430	0.021
17 Tone_pos	0.034	0.431	0.667	-0.141	0.219
18 Tone_neg	-0.227**	-2.916	0.004**	-0.396	-0.076
19 Emotion	-0.181*	-2.308	0.022*	-0.331	-0.026
20 Emo_pos	-0.037	-0.460	0.646	-0.099	0.061
21 Emo_neg	-0.196*	-2.505	0.013*	-0.271	-0.032
22 Emo_anx	-0.110	-1.383	0.169	-0.150	0.026
23 Emo_anger	-0.164*	-2.087	0.038*	-0.049	-0.001
24 Emo_sad	-0.158*	-2.001	0.047*	-0.058	-0.0004
25 Socrefs	0.027	0.338	0.736	-0.241	0.341
26 Family	-0.065	-0.820	0.413	-0.263	0.108
27 Friend	0.014	0.178	0.859	-0.043	0.052
28 Female	-0.090	-1.132	0.260	-0.129	0.035
29 Male	-0.027	-0.334	0.739	-0.074	0.052
30 Tech	0.147	1.863	0.064	-0.010	0.340
31 Physical	0.006	0.079	0.937	-0.252	0.273
32 Health	-0.014	-0.181	0.857	-0.258	0.215
33 Illness	-0.039	-0.490	0.625	-0.124	0.074
34 Wellness	0.045	0.565	0.573	-0.039	0.070
35 Mental	-0.111	-1.399	0.164	-0.107	0.018

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 13: Social Support & LIWC Categories: Correlations & Significance Test

4.3 Social Networking Sites & Pregnancy

Several people today use social networking sites like Facebook, Instagram, Reddit, Twitter, and other forums to quickly and effortlessly get topic-specific knowledge so that they might very well navigate this crucial and life-changing phase cautiously and without encountering additional difficulties (Li et al., 2018; Friedman, 2011). Miscarriage, gestational diabetes, in-vitro fertilization (IVF), post-traumatic stress disorder (PTSD), cervical dysplasia, life-threatening occurrences, etc. are just a few of the complications that were highlighted in the sample. Overall, it is clear from the self-disclosures that most of them use social media for subjective purposes, and there have been testimonies about social media having both beneficial and detrimental effects.

Many participants emphasized the significance of safeguarding psychological well-being and a sense of peace of mind, which was impossible on various social media sites, such as Facebook and Instagram. This is primarily due to the financial aspect of the posts that were generated. Many people have stated that these social media platforms "portray" pregnancy as being normal. A small subset, nonetheless, was pleased with the beneficial and fulfilling experience they had while using these social networking networks. Out of the many benefits of using social media, most of the participants emphasized that it helped them achieve the following objectives: continuous psychological support, peer support, and literacy regarding health issues.

The participants' responses needed to be carefully examined in order to comprehend personal emotions in an attempt to appreciate the role of social media during pregnancy. The sample was divided into two categories: the first one based on pregnancy status and the second one based on complications associated with pregnancy. In order to further investigate whether or not they are content with their use of social media, the pregnancy status group was separated into First-Time Mothers and Second-Time or more Mothers. According to figure 7, 26% of all participants expressed dissatisfaction with using social media while pregnant.

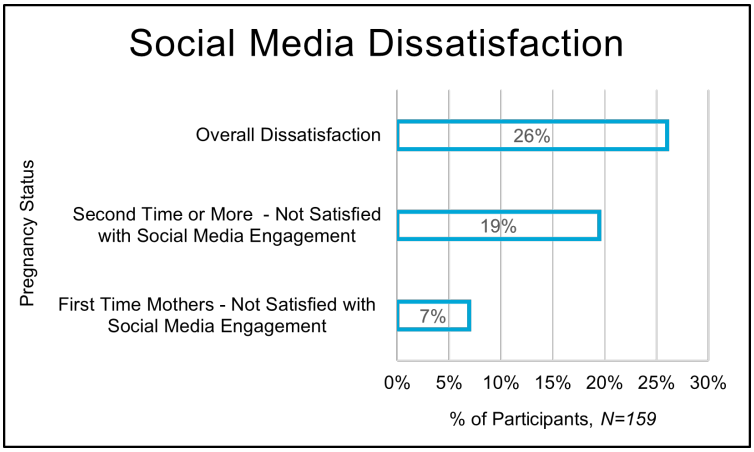


Figure 6: Profile: Dissatisfaction

However, given that there were revelations about social media being both beneficial and disturbing at the same time, it is not possible to assert that 74% of the participants were completely satisfied as shown in figure 6. As a result, the following subsections will focus on the impact social media had on participants while they were pregnant.

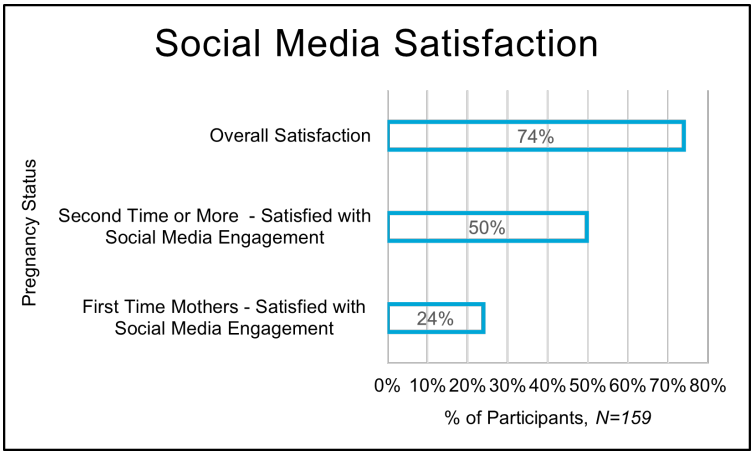


Figure 7: Profile: Satisfaction

In order to comprehend the levels of satisfaction and dissatisfaction, the complications-related pregnancy category had additional analysis. There were 63 people in the sample who experienced some pregnancy-related complications. In this group, 27% of the participants expressed dissatisfaction with the use of social media, while 73% expressed satisfaction with their use of social media while being pregnant a shown in figure 8.

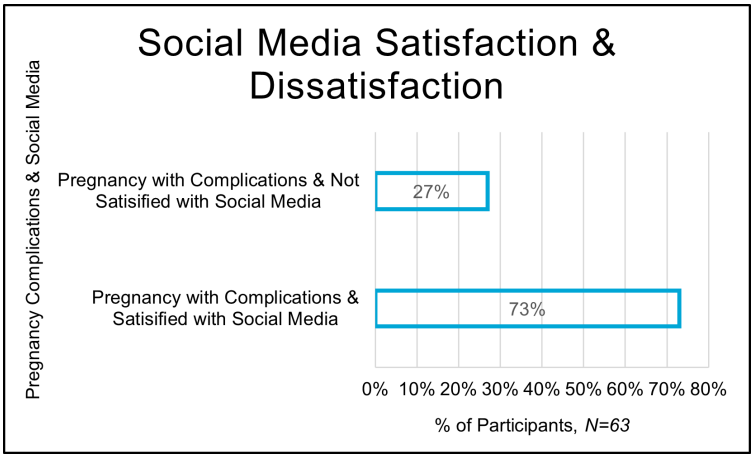


Figure 8: Profile: Satisfaction & Dissatisfaction

The next subsections will examine the two categories, their subcategories, and what survey participants expressed in their responses about the usage of social media during pregnancy.

4.3.1 First Time Mothers & Satisfied with Social Media

Most first-time mothers have a persistent desire to know if they are performing specific tasks in the proper manner (Social Comparison Orientation). Even though they consult their doctor for advice, social media plays a significant role in helping individuals find quick tips and information regarding necessities. Additionally, a lot of participants indicated that they preferred using Reddit more frequently than other social media platforms, primarily due to the privacy it offers. Furthermore, a person can join particular subreddits based on their needs. In the case that follows, one of the participants made use of this advantage to seek peer support on the "fitpregnancy" subreddit (Social Support). This response could suggest that the participant is looking for reliable information about the ability to do weightlifting during pregnancy and is attempting to compare it to that of others (Comparison of Abilities). However, the participant also emphasizes how opinions impact their feelings, such as how stretch marks make them feel (Negative Affect).

> "Most uncertainties surrounded ***body imagine and fitness level*** as I was a weightlifter when beginning my pregnancy... It is nice hearing ***first hand experience*** rather than an article from someone who has never been pregnant before... I have been able to continue weight lifting, gain the minimum amount of weight, and stay strong. ***Social media does impact how I view my body and stretch marks*** for example, as I really do not like my stretch marks..."

Other participants also indicated that despite social media being overwhelming, they continue to use it since it fulfills some crucial purposes. Many participants stated that they were able to learn enough from the experiences of others. The participant in the example below indicates how some posts can provoke unfavorable feelings (Negative Affect). However, by comparing her health concerns with those of other individuals, the participant also emphasizes the significance of embracing helpful recommendations (Comparison of Abilities).

> "... my only big symptom is ***heartburn***. I am the first of my friends to be pregnant, so I often go on reddit to get perspective on symptoms, but sometimes the posts tagged "rant/vent" can be a little overwhelming and I don't read them. However I did ***find*** my most ***reliable heartburn trick*** on reddit: lying on my left side. For that reason I ***continue to use reddit*** in case I come across any other tips or tricks that could ***help*** me."

Many first-time mothers find it helpful to use social media to look for different health-related information and guidance. They compare their own experience to that of others to see if they are dealing with a situation skillfully, as shown in the above-listed examples. First-time mothers frequently mentioned that they prefer Reddit over other social media platforms since it is possible to get pertinent information across a wide range of subreddits.

4.3.2 First Time Mothers & Not Satisfied with Social Media

Although social media serves a variety of functions, some participants did not support its use when it pertains to a significant life event like pregnancy. The opinionated and imbalanced discussions that take place on social media are largely responsible for this attitude. One of the participants added that social media can be a helpful choice for peer support (Social Support), even though it might be difficult and counterproductive to be a part of certain groups (Negative Affect) as follows:

> "... I typically do not ***use social media for research***, and instead look up medical studies or medical articles from reputable sources... I often notice ***radical emotions or opinions***. I ***don't feel*** it's ***healthy or productive*** to participate in ***unbalanced discussions***. There are certain communities on social media I have ***joined*** and then ***immediately left due to a flood of uneducated, poorly written, or generally incorrect posts***... I stay in supportive groups that freely share ideas, even if they are opposing ideas..."

The majority of the participants pointed to the "perfect" portrayal of pregnancy as the other remarkable discrepancy. The participants, however, refuted this idea of perfection and insisted that their daily social feed is full of only "happy posts." The personalization algorithm is also alleged to steer them to a lot of uninteresting topics. The participants also had issues with the Facebook and Instagram social media influencers because they frequently had a financial component. One of the participants brought up the personalization algorithm's recommendations for joyful postings and other mothers having the ability to live a perfect life (Comparison of Abilities) and further being emotionally affected by such posts (Negative Affect) as follows:

> "... going more on social media put me in an algorithm where I kept being ***confronted with "the perfect mommy life" or accounts spreading varying types of information***. I am being bombarded and I feel even more overwhelmed. ***Reddit is fine because I can filter***. ***Instagram is the worst*** as I keep receiving ads and "suggested" accounts. I even received pro-life ads from the USA as a European pro-choice person."

A few first-time mothers believed that some of the social media groups are filled with toxic and ineffective debate which promotes unpleasant feelings during pregnancy. Additionally, some participants expressed frustration with how social media portrays pregnancy as "normal."

4.3.3 Second Time or More & Satisfied with Social Media

When it comes to second or subsequent pregnancies, women are considerably more confident than they were during their first pregnancy since they have a greater understanding and can adapt to the circumstance easily with better strategies (Comparison of Abilities). Depending on the number of pregnancies, they also frequently browse different subreddits to gather relevant information. One of the participants mentioned Reddit as a fantastic peer support (Social Support) network, and it is

clear that the participant compared her pregnancy to those of other women at various stages to more effectively adjust and adopt practical techniques to deal with the situation (Comparison of Abilities).

> "Reddit is a ***great resource for the whole pregnancy experience, at all stages- trying to conceive to pregnant (all the highs and lows), birth stories, and everything after***... Once I got pregnant, I went to a current pregnant group and we talked about our pregnancy journey - ***our struggles, our wins, dr appt experiences, stage of nesting, prepping for hospital bag, and everything pregnancy related***... I love ***learning about others experience during pregnancy*** - there's no judgement in my Reddit groups! It's very wholesome."

As previously mentioned, the first pregnancy is often filled with anxiety, and a mother wants to know as much as she can about her own health and that of her unborn child. This is mostly because hearing about other people's experiences can be reassuring and reduces the anxiety associated with pregnancy. The following response from a mother reveals that she had a curiosity about learning more during her first pregnancy because it helped her feel less uncertain (Negative Affect) and gave her a way to learn more about her own and the baby's well-being.

> "... I like to get information straight from ***other experiences and social media provides a wide range of folks and experiences to learn from***. With my first pregnancy, I read a TON of labor and delivery stories and it was really ***relaxing for me to read about the different possibilities and outcomes, even understanding that some are difficult to accept***. I would rather understand the reality of my/baby's situation than go in ***unaware of what we were up against and what my choices could be***."

One of the major characteristic is the abundance of information available in Reddit communities classified according to different circumstances. So a mother will inevitably resort to Reddit to assess the situation and consider all of the potential consequences. This makes it possible for the individual to be ready for the future. The following two examples highlight how people responded to the scenario based on their use of social media when they were pregnant. In the first example, the participant emphasizes how social media provided as a means for receiving emotional support and answers to a range of questions (Social Support). In the second example, the participant describes how she used social media to find relevant information. Due to the participant's confidence during the second pregnancy, she is eager in learning more about raising two children (Comparison of Abilities). The participant does draw attention to the fact that posts about pregnancy complications may cause unfavorable feelings (Negative Affect).

"This pregnancy was somewhat difficult to conceive and I needed ***ovulation induction medication (clomid)***. The normal uncertainties followed, would I miscarry, would everything look OK at the anatomy scan? I've dealt with this by ***talking it over with my husband, sister, and a pregnancy group on discord of people delivering the same month I am***. The ***discord group has been great for suggestions, camaraderie, and sympathy***. People are willing to lend an ear and discuss everything and it's a smaller group so it feels ***fairly intimate***. I am also in a reddit group that the discord stemmed from but it's too big and I don't feel connected to it... The discord has reactions which are very helpful."

"... Second pregnancy, ***so feeling less anxious than my first pregnancy***. Joined a few due date Facebook groups to read other people's questions and experiences. Facebook groups have been useful, but I ***rely on them less than I did in my first pregnancy***. Posts about other people experiencing ***miscarriage or complications can be concerning*** More ***interested in how to make 2 kids work*** than worrying about the current pregnancy and upcoming birth."

Social media also provides an extensive platform for connecting with others from similar cultural backgrounds (Social Support). Such Reddit groups with a connection to cultural elements are numerous. The next two examples emphasize this advantage associated with social media:

"... I sought out pregnancy groups online to feel connected and possibly make friends. ***I found pregnancy groups from my own country to be most relatable but they don't have discussions as often***. Larger groups consist of mostly American mothers which are unrelatable to me. Social media groups helped me find what products to buy/not, apps to use/avoid and also learn about different cultural aspects of pregnancy and birth"

"... I followed Facebook pages such as Red Nose Australia, Australian Breastfeeding Association, PANDA. I used subreddits that focused on ***science based parenting practices, and Australian specific content***..."

The majority of women who were having their second or subsequent pregnancies reported feeling more pessimistic during their first pregnancy than during their second since they were able to adapt more easily after their first. They did, however, use social media for peer support and to learn more about the different experiences of other people.

4.3.4 Second Time or More & Not Satisfied with Social Media

Second or subsequent pregnancies are frequently complicated and are riddled with individual experiences. With subsequent pregnancies comes a major physical and psychological change. In the following three examples, the participants indicated that tension and fear were brought on by conflicting per-

spectives (Negative Affect) on social media.

> "... I particularly looked for the experience of women who already had children, nurses and midwives who were going through pregnancy at the same time... The only downside to social media is that it's ***very opinionated***..."

In the following response, the participant discusses how she planned for her delivery by comparing her situation to other women who had undergone c-section deliveries (Comparison of Abilities).

> "... I wouldn't say I ***rely on social media*** but I would look up things about pregnancies and birthing. I enjoyed reading different stories about a c section to help prepare me. Sometimes it also ***made me more tense though*** ..."

In the following response, the participant highlighted the inadequate representation of consecutive pregnancies' effects on the body (Social Support) and the emotional strain that comes with altering body shape (Comparison of Abilities & Negative Affect).

> "... I chose not to ***share my pregnancy on social media*** because I didn't want people to see my changing body, I wasn't really happy with how much ***weight I gained during pregnancy***. I tried to be optimistic but I didn't see a lot of ***representation on social media***..."

Due to the increasing element of fear brought on by reading about diverse perspectives, the majority of women who were pregnant for the second or subsequent time expressed dissatisfaction with the use of social media during pregnancy. Additionally, a lot of participants mentioned that they were concerned about their physical changes and that social media lacked content that reflected changes in body image.

4.3.5 Pregnancy with Complications & Satisfied with Social Media

The prevalence of distress disclosure relating to pregnancy in the responses is very significant. Many participants highlighted that the anxiety and fear associated with the complications resulted in distress disclosure. Reddit, in particular, includes some features such as up-votes, down-votes, and a comment section. Hence, by disclosing their pregnancy complications people obtain informational and emotional support from others. This fuels active engagement on social media during pregnancy as it helps people unburden themselves and alleviate stress. However, several individuals claimed that they just used social media to evaluate and learn about their ailments and that they were very careful not to disclose a lot of personal medical information on it. In each of the cases listed below, individuals compared their ability to become pregnant and give birth to a healthy child despite having a variety of health concerns (Comparison of Abilities). Additionally, the examples emphasized the value of peer support, which facilitates learning more about comparable pregnancy-related situations (Social Support).

"I've had ***5 previous losses*** in the first trimester. I've been through ***IVF***. My current pregnancy is high risk. I've seen the heartbeat but am still in the first trimester. I've been spotting and cramping and freaking out about every little sensation. ***I rely on social media because I cannot talk to my friends and family about the topic***... And I cannot call my ***doctor every day***. So basically this is my ***only option*** if I search for input to try and find some ease in my negative thoughts. ***Rationally I know how stupid this behavior is - I am a psychologist myself*** - but as I mentioned. ***Hopelessness and fear drive me to still go to social media for advice***."

"This pregnancy is my first viable pregnancy after ***three first trimester miscarriages***. For this pregnancy I had ***hyperemesis gravidarum (HG)*** and was hospitalized for 3 days. I had a PICC line for 8 weeks... but I was totally disabled from weeks 6-18 and relied on my partner for everything. ***I relied on social media to learn about my condition, connect with other pregnant people, and cope with the trauma of miscarriage and HG***. Social media has been crucial for me to ***heal from loss and disability*** from HG... but I found ***comfort with others*** who had the ***same things on social media***."

In the following example, the participant used social media to investigate and learn more about effective ways to manage hyperemesis gravidarum (severe vomiting during pregnancy). The participant probably compared herself to others who had similar experiences and made adjustments to the circumstance (Comparison of Abilities).

"High risk pregnancy due to ***cerebral AVM and epilepsy***... Relied on social media for ***peer support, similar experiences, sharing and discussion groups***... Learned that medical professionals do not provide the peer support, camaraderie, connection and community that is vital to ***building confidence during pregnancy***. Social media facilitates vital connection with others. ***"It takes a village"*** occurring in a virtual context."

In the following example, the participant made a comparison between herself and her peers and realized that her parenting technique was different from that of her peers (Comparison of Abilities).

"... It has been both easier and harder! We've had a few more uncertainties- ***down syndrome potential with extra blood tests, transverse and then breech baby***. I have definitely used ***Reddit more this pregnancy*** (found the Reddit parenting forums during late night feeding with baby 1!) And I'm also a part of a local mum's social media group and a chat of 10 mums who have birth around the same time as us... ***I've definitely felt that I do parenting different to my peers***..."

Participants who had issues with their pregnancy preferred to seek out peer support on social media.

They had a great desire to gain additional knowledge from comparable experiences so they could adjust to the situation more effectively.

4.3.6 Pregnancy with Complications & Not Satisfied with Social Media

The social environment in which pregnancy-related pleasant and hurtful emotions are taking place goes far beyond face-to-face encounters. In the following examples, the participants were dissatisfied with the propagation of inaccurate information and negative connotations linked with the posts regarding pregnancy-related issues (Negative Affect). Many participants described their use of social media as "looking" or "lurking," but they weren't actively implementing the recommendations.

> "... Last year we miscarried so I was anxious at first during this pregnancy. I've ***avoided mums/pregnancy groups online for the most part***... I was diagnosed with Gestational diabetes at 28w. I joined a few groups to see what it was all about. I've noticed ***they are filled with very anxious mothers*** who don't seem to understand the ***science of what's happening to their bodies***. I've seen ***poor advice given***. I've mainly contributed by ***reassuring others and providing sensible advice***..."

> "***Very rarely relied*** on social media. I ***lurked*** and looked at posts that were interesting but rarely interacted. While it's nice to see other women experiencing the same thing as me, that doesn't mean I'm going to completely ***open up to a bunch of strangers***. I should note that I'm on the ***autism spectrum and have ADHD***... Pregnancy brain has made that waaaay worse. For these issues I met and continue to meet with my ***mental health practitioner regularly***. I also met with a ***lactation specialist*** about medication options that are safe for breastfeeding..."

Pregnancy-related issues have a history of being difficult and frustrating. Every individual has a different experience. In the following example, the participant was not able to experience a normal pregnancy and so the use of social media generated a bad emotional experience (Negative Affect). Also, the participant felt "envious" after viewing social media feeds of "perfect" pregnancies and "healthy" newborns (Comparison of Abilities & Negative Affect).

"Encountered severe early onset ***preeclampsia and delivered 9 weeks early***. I constantly felt like I had done it all wrong, like I missed out on really ***huge milestones by not being able to get maternity photos, have a big beautiful baby shower, or have those sweet newborn hospital photos everyone has***. I didn't get the picture perfect story from my delivery. My postpartum was not filled with precious baby photos and me "looking a mess", my baby was in the hospital hooked up to wires that looked frightening in photos... ***I was so so envious of, what felt like, EVERY other mother having an uncomplicated pregnancy, delivery, and postpartum***."

The use of social media makes it even harder for the participants because there is a lot of incorrect information and suggestions for such issues, which adds to the existing negative emotions associated with pregnancy-related complications. Additionally, several participants felt envious of the pleasant posts made by other mothers when they were going through pregnancy complications.

Answer to SQ3

SQ3 aimed to identify the role played by social networking sites in assisting mothers during their pregnancy. The categories negative emotion, emotion, negative tone, anger, and sadness have a negative correlation with social support. As a result, these five linguistic categories serve as reliable measures of high social support. This is consistent with the findings that socialization, supportive relationships, and positive associations are linked to lower levels of anxiety and depressive symptoms as observed by Seabrook et al. (2016). In order to determine the role played by social media during pregnancy, the responses of the participants were also examined. Given the apparent benefits of peer support and quick access to information, many mothers used social media while they were pregnant. Due to some biased content and a lack of representation, some individuals did, however, find social media to be overwhelming.

4.4 LIWC Analysis: Consolidated Results & Match with Previous Observations

The LIWC-22 version now includes a significant number of new components. As a result, this study allowed examining various, uncharted categories. The consolidated outcomes of this research study are presented in table 14 under the following two domains: *Negative Affect* and *Social Support & Social Comparison*. A list of earlier research findings is included, and similarities between the current study and earlier research are highlighted. From table 14, under "Pregnancy Distress", the findings of *negative emotion* and *negative affect* from this study are similar to prior studies reported by Schoch-Ruppen et al. (2018) and De Choudhury et al. (2013). However, several additional categories have been identified as listed under "Categories Observed in Current Research - Negative Affect". Further, under "Social Comparison Orientation", the findings such as *negative affect, negative emotion, anxiety, sadness, personal pronouns*, and *mental illness* from this study are similar to the findings observed by Kramer et al. (2014), De Choudhury and De (2014) and Seabrook et al. (2016). Also, the additional categories that were identified are listed under "Categories Observed in Current Research - Social Support & Social Comparison".

Topics	*Literature*	*LIWC Categories Observed*	
		Match with Previous Research (Note: Matching category is in "Bold")	*Categories Observed in Current Research*
Pregnancy Distress	Women's Word Use in Pregnancy: Associations With Maternal Characteristics, Prenatal Stress, and Neonatal Birth Outcome (Schoch-Ruppen et al., 2018)	1. First-person singular 2. First-person plural pronouns 3. Positive emotion words **4. Negative emotion words** 5. Cognitive mechanisms	**Negative Affect:** 1. Negative tone 2. Emotional tone 3. Negative emotion 4. Anger 5. Mental 6. Analytic 7. Third person plural 8. WPS 9. Dictionary words 10. Linguistic dimensions
	How Social Information Networks Reflect Major Life Events: Case of Childbirth (De Choudhury et al., 2013)	1. Positive Affect (PA) **2. Negative Affect (NA)**	
Social Comparison Orientation	Experimental evidence of massive-scale emotional contagion through social networks (Kramer et al., 2014)	1. Positive Affect (PA) **2. Negative Affect (NA)**	**Social Support & Social Comparison:** 1. Negative emotion 2. Emotion 3. Wellness 4. Sadness 5. Emotional tone 6. Negative tone 7. Ilness 8. Anxiety 9. Total pronouns 10. Personal pronouns 11. Analytic 12. Authentic 13. Dictionary words 14. Linguistic dimensions 15. WPS
	Social Networking Sites, Depression, and Anxiety: A Systematic Review (Seabrook et al., 2016)	1. Positive emotion **2. Negative emotion** **3. Anxiety** 4. Anger **5. Sadness** **6. Personal Pronouns**	
	Mental Health Discourse on reddit: Self-Disclosure, Social Support, and Anonymity (De Choudhury and De, 2014)	1. Cognitive 2. Inhibition 3. Present 4. First-person singular pronouns 5. Second third-person pronouns 6. Affect 7. Social **8. Negative emotion** **9. Sadness** **10. Mental Illness** **11. Anxiety**	

Table 14: Brief Overview of LIWC-22 Final Results

5 Discussion

The scientific and practical implications of the empirical findings are discussed in this chapter. The limitations and future applications of this research are discussed in the subsequent subsections.

5.1 Scientific Relevance

In this subsection, the outcomes of the exploratory study are compared with those of the literature review. The *35 LIWC categories* selected in subsection 3.5.3 functioned as the dependent variables in this study, whereas *Comparison of Abilities, Negative Affect,* and *Social Support* functioned as the independent variables.

5.1.1 Linguistics & Comparison of Abilities

First and foremost, the correlation analysis revealed that pregnant women with a higher degree of social comparison orientation used words with negative emotion, negative tone, emotion, and illness in comparison to pregnant women with a lower comparison orientation who focused on anxiety, authentic, emotion, negative emotion, personal pronouns, and I. The use of the first-person singular pronoun (I) is associated with self-focus and is thus an indicator of lower social comparison. The findings of previous research on the use of the first-person pronoun (I) that relates to social withdrawal are confirmed by the above results (Tausczik and Pennebaker, 2010; Boyd, 2017; Schoch-Ruppen et al., 2018).

Several survey responses indicate that people use social media platforms to look up specific information about their pregnancy rather than actively disclosing any personal information. This may be connected to research that suggests people compare unintentionally (Schachter, 1959). Anxiety may play a role in this, as fear, worry, or uncertainty might increase the propensity to compare (Buunk and Ybema, 1997). Numerous responses also show how pregnant women utilize the internet to confidently explore knowledge, prevent worry brought on by knowledge processing, obtain resources on their own, and learn more about their pregnancy than what their healthcare provider has to say. The analysis of the participants' responses also revealed that one or more of the comparison objectives, such as self-evaluation, self-improvement, and self-enhancement, were fulfilled by comparison via social media (Suls and Wheeler, 2013; Friedman, 2011). This could be explained by one of the participant's responses, which was as follows:

> "I have had a fairly easy pregnancy and have been able to ***maintain my physical and mental health*** while having a ***generalized anxiety disorder***. While my anxiety becomes intrusive at times, ***I have strategies and ways to combat these thoughts and emotions developed over the past 2 years***... I have used ***forums like Reddit primarily to understand what other people's experiences are as each pregnancy is unique but I use my body and mental health cues to guide my expectations and daily activities***."

In this specific case, it should be highlighted that the person has a medical condition and has through time developed effective coping mechanisms to deal with it. The participant creates her plan after conducting a "self-evaluation" based on the experiences of many other people. It is clear that there are other information sources during pregnancy besides medical experts and in-person encounters (Friedman, 2011). Others who had a comparable event would probably have described how certain changes occurred in their physical or mental states. It should be emphasized that this participant does not entirely rely on her encounters on social media to get by throughout her pregnancy.

Furthermore, the linear regression study discovered that the following nine categories were significant in the comparison of abilities: negative emotion, emotion, wellness, authentic, emotional tone, dictionary words, linguistic dimensions, negative tone, and anxiety. This is consistent with previous findings that when there is stress, uncertainty, or adjustment, the demand for social comparison increases as observed by De Choudhury and De (2014); Buunk and Gibbons (2006). As a result, social comparison's adaptation and emotion regulation functions may become more important in unexpected and distressing contexts. Women discuss personal experiences about the numerous physical and emotional adjustments they undergo with others through their maternity journey and it is evident in their natural language through sharing authentic experiences about health and wellness O'Leary et al. (2016). Individuals experiencing health complications, such as during pregnancy, are frequently directed to medical assistance forums or self-refer to them for transparency and exploration of their health complications, therapy, and recuperation (Friedman, 2011). The findings of this study concluded that pronoun usage, emotion, and health-related words are important additional linguistic features for social comparison recognition.

5.1.2 Linguistics & Negative Affect

The correlation analysis between the LIWC categories and negative affect revealed that pregnant women with high negative affect used words with a negative tone, anger, mental, and third-person singular pronouns (she, he, her, his) and analytic when compared to those with low negative affect. The observation negative tone is in accordance with the previous observation by Schoch-Ruppen et al. (2018). However, additional findings such as anger, and mental observations are also equally important (Boyd, 2017).

Besides that, negative tone, WPS, emotional tone, dictionary words, linguistic dimensions, shehe (third-person singular pronouns), negative emotion, and anger were significant results of linear regression analysis, indicating a high level of negative affect. The following categories: negative emotion, negative tone, anger, and emotional tone are consistent with previous theoretical findings regarding pregnancy-related characteristics, as positive associations between negative emotion words and negative experiences such as pregnancy complications were observed Rude et al. (2004); Orsillo et al. (2004); Schoch-Ruppen et al. (2018). Moreover, as maternity is a significant life experience, pregnancy-related stress may be more closely linked to negative outcomes than regular emotional turmoil (Lobel and Schetter, 2016).

In contrast to prior work by Schoch-Ruppen et al. (2018), this study found that there seemed to be higher usage of third-person singular pronouns (she, he, his, her). The study emphasized the use of significant plural pronouns, which refer to signs of collective orientation. The use of third-person singular pronouns in this study, on the other side, could indicate that women were concerned about the health of their unborn child or themselves and attempted to understand their experiences by evaluating themselves to others in their social networks. This was observed by De Choudhury and De (2014) while studying about mental health discourse on Reddit. The use of pronouns may be more indicative of a pregnant woman's psychological state and may be a useful tool in identifying stress and depressive symptoms (Tausczik and Pennebaker, 2010; Schoch-Ruppen et al., 2018).

5.1.3 Linguistics & Social Support

The correlation analysis between the LIWC categories and social support revealed that pregnant women with high social support used words with a lower negative tone, sadness, anger, emotion, and negative emotion. This is consistent with previous findings in which positive emotion words were found to be less relevant to social support. This was observed by Settanni and Marengo (2015) while researching the relationship between social support and depressive symptoms through social media posts. This is further supported by the theoretical underpinnings that pregnant women are reported to be suffering from psychosocial stress (Woods et al., 2010) and the following measures: negative tone, sadness, anger, emotion, and negative emotion may be indicators to measure social support levels with the partner and the social circle during pregnancy. Minimal social support has indeed been attributed to an increase in depressive symptoms during maternity (Adewuya et al., 2007).

Furthermore, linear regression analysis revealed significant results for negative emotion, negative tone, emotion, anger, and sadness. This supports previous findings that women with a higher sense of social support sought feedback and assistance on their problems related to traditional parenting style issues, whereas mothers with a lower sense of social support used many sentimental terms, as observed by De Choudhury et al. (2014a). The above-mentioned words are frequently used to describe depressive symptoms because they are generally associated with fewer optimistic encounters and more negative experiences (De Choudhury et al., 2014b, 2013; Seabrook et al., 2016). It is also worth noting that

the negative correlation between the categories and social support suggests that mothers' negative experiences are influenced by the negative experiences of others, a phenomenon known as emotional contagion (Kramer et al., 2014). Many survey responses from participants made clear mention of this trend, and the following example highlights one such occurrence:

> "... I use social media only sometimes and primarily to feel less *alone* and not for *advice*. I am careful to skim posts before I really read them because I find that other people's experiences or concerns can create *anxiety* for me... I focus on posts that are more *positive, less serious, or humorous*..."

5.2 Practical Relevance

The purpose of this study was to investigate pregnant women's choice of words, its association with emotional expression, and social comparison on social networking sites during pregnancy. The findings of this study observed that pregnant women frequently use social media to represent their feelings about their pregnancy, illness, or complexities. One such participant's experience is highlighted in the following example:

"... I have ***hypertension (high blood pressure; from pre-pregnancy)***, as well as **gestational diabetes (GD)**. This makes me "high risk" for pregnancy, and I get extra monitoring through a ***Maternal-Fetal Medicine doctor (MFM)***... as well as monitoring my blood pressure at home, ... and now monitoring my ***blood glucose levels***..."

The social networking site viewers are more likely to understand and empathize by providing more helpful and constructive feedback, suggestions, and opinions in response to honest confessions. According to the findings of this study, pregnant women with a higher social comparison orientation engage in more self-disclosure. This is heightened when complete anonymity is present, as there is a decreased sense of vulnerability during discussions about health or wellness. Furthermore, social media-related health discourse is used for guidance and support, which is highly valued in psychological therapeutic interventions (De Choudhury and De, 2014).

A lack of certainty, inaccuracy, and ambiguity describe healthcare knowledge in pregnancy care. Since maternity vulnerability variables are inherently ambiguous, the application of lingual estimation allows data to be described in an even more constructive form (Umoh and Nyoho, 2015). Many women establish extreme anxiety about giving birth all through gestation (Fenwick et al., 2009). This is a medical situation largely defined by some signs (sleep disturbances, severe anxiety, etc.) that tremendously affect women's capacity to undergo their daily lives (O'Connell et al., 2017) furthermore seriously impacting their capacity to deal with pregnancy and delivery (Molgora et al., 2020). Though the transition to parenthood is touted as one of the greatest times in a parent's life (Hansen, 2012), scientific facts do not justify such an increase in parental happiness, but rather suggest that it might lead to

tiredness and eventually breakdown (Meeussen and Van Laar, 2018). The findings of this study, which emphasize the importance of the relationship between pregnancy experiences and linguistics, could therefore be useful in analyzing the psychological states of pregnant women.

The findings of this study may have an impact on pregnancy care practices. The worldwide proliferation of mobile healthcare products provides the ideal platform for health applications (mHealth) to close the gap in knowledge in maternity care as there is indeed a wealth of publicly view-able material about pregnancy and women's health, with several people choosing to get this information via the internet (Ford et al., 2020). Many expectant mothers nowadays are downloading and using smartphone applications to obtain, save, and exchange health data (Hiremath, 2016). Healthcare professionals use healthcare voice assistant applications to have complete access to medical information. Pregnant women are currently synchronizing their domestic diagnostics with their physicians via digital medical records on a routine basis (Mann et al., 2020).

In the present era of digital transformation, AI-powered virtual assistants are leading the charge by embodying the purpose of a digital aide that can maintain a dialogue via voice or text - based methods (Gonzalez et al., 2021; Bokolo, 2021). Bharti et al. (2020) underline the value of enhanced functionality in remote patient monitoring by recommending and comparing the virtual assistant "Aapka Chikitsak" to others such as ELIZA and PARRY. Although such virtual assistants are functional, an advancement in the voice assistant's abilities is required by integrating an antidepressant medication framework that could provide supplemental facilities such as musical therapeutic interventions, psychological health screening, and self-evaluations. This will also help in the development of dedicated websites for the interactional application for those who prefer reading more available information, such as personalized experiences on mobile health apps. Thus, by combining aspects of linguistics, social comparison, and emotional expression, the findings of this study will aid health chatbot developers in understanding the significance of the comparison process and its influence during pregnancy.

5.3 Limitations

This research has certain limitations. First and foremost, this study only used the three scales and linguistic analysis of textual input from participants who answered to one question in no more than 100 words. Some of the sub-scales (Gratitude (GDPS Sub-scale), Antenatal care (GDPS Sub-scale), Comparison of Opinions (INCOM Sub-scale)) were unreliable, despite the overall scales for gratitude, distress, and comparison measure being reliable. Further, According to prior studies, significantly larger narratives can improve the precision and standard of LIWC analysis outcomes (Schoch-Ruppen et al., 2018; Landoni et al., 2022; Pennebaker, 1997). Thereby, gathering a larger discourse dataset with more lexical items could aid in enhancing the findings' accuracy.

The second limitation concerned the utilization of only textual data. Even while text-based method is

still the most common way in which individuals convey their sentiments about other individuals, situations, or objects, it continues to be very challenging to retrieve emotional content through writing due to the complexity of the input since there may be numerous thoughts and feelings present in a simple sentence (Sailunaz et al., 2018). The most effective and organic mode of interaction, however, is speech (Bharti et al., 2020). Morales and Levitan (2016) highlight that employing textual and speech-based characteristics together yields superior outcomes over doing so separately.

The next limitation was regarding the selection of LIWC categories. The current study focused on specific LIWC categories in line with emotional expression and social comparison scale based on prior studies (De Choudhury et al., 2013; Kramer et al., 2014; De Choudhury and De, 2014; Schoch-Ruppen et al., 2018; Seabrook et al., 2016). The most recent version of LIWC, however, now offers extra aspects that could be investigated further to comprehend its properties concerning pregnancy experiences.

Additionally, there was a limitation in effect regarding the demographic information. The majority of the participants in the current study were from English-speaking nations. The use of specialized maternity care differs significantly between nations as well. Women who live in the Asian continent have been shown to use maternity medical care at significantly variable rates than women in other parts of the world (Tikkanen et al., 2020). Also, Withers et al. (2018) reported that due to a multitude of social and institutional obstacles, Latin women have become the part of the population that is least likely to seek psychiatric care for postnatal distress. As a result, a varied population broadens the applicability of the findings to a larger community and aids in minimizing preconceptions about a specific community.

Finally, it should be noted that there are likely other subreddits where pregnancy-related topics are discussed in depth that were not included in this study. The survey participants were primarily drawn from the Reddit groups that were approached for responses. This was an exploratory study that focused on a set of Reddit communities that granted permission to collect valuable information; however, expanding to certain other forums appears to be a top priority for prospective developments (De Choudhury and De, 2014).

5.4 Future Work

In contrast to previous studies that focused solely on one aspect (De Choudhury et al., 2013; De Choudhury and De, 2014; Kramer et al., 2014; Seabrook et al., 2016; Schoch-Ruppen et al., 2018), this current study was an exploratory study that attempted to discover relationships between various linguistics categories and the following two aspects: social comparison and emotional expression. This study focused on finding a relationship between 35 selected LIWC categories in accordance with the scales. However, the most recent version of LIWC has some new characteristics that might be further investigated to understand how they relate to pregnancy experiences and potentially make it simpler for medical professionals to diagnose any prospective psychological issues during pregnancy.

The textual input can be analysed using more than 90 categories provided by LIWC, but it is not always precise. Bidirectional Encoder Representations from Transformers (BERT) is a fine-tuned model that may be designed to adapt and displays sophisticated competency level for a broad array of Natural Language Processing (NLP) functions. The development of NLP software for the healthcare sector has garnered increasing attention in recent years as a way to comprehend healthcare data at the micro level (Velupillai et al., 2018). This sophisticated approach distinguishes from LIWC-22 in that it can adapt to the linguistic features and derive associations (Devlin et al., 2018). Informal and text - based healthcare information collected reveals underlying insights that is highly beneficial in developing medical interventions (Harnoune et al., 2021). This could result in the emergence of new information or justification, which could contribute to unique insights and lessen uncertainty in pregnancy care practices.

The next research phase should include consideration of a large number of other nationalities. However, due to the ambiguity and lack of certainty in pregnancy care, the findings from the current and preceding research cannot be properly extended to pregnant women. For example, a Latin woman might use different words than the other English-speaking participants because they go through changes in how they see themselves or because of other conditions during pregnancy, which influences how they use words (Withers et al., 2018; Schoch-Ruppen et al., 2018; Tikkanen et al., 2020). Thus, by integrating participants from other nations, future studies should examine pregnant women's word use and its links with their emotional state in greater detail which will ultimately aid in strengthening the generalization of the results.

The theory supporting the use of pronouns during pregnancy necessitates further investigation. The maternal psychological characteristics in this study were only evaluated once, while the participants were pregnant. According to this study, there is a connection between third-person singular pronouns and negative affect. However, prior studies have focused on singular or plural first-person pronouns (Schoch-Ruppen et al., 2018; Landoni et al., 2022). Therefore, more research might be particularly useful in understanding how they are impacted by various stressors or the feeling of interpersonal connection, as well as their significance for physical and mental well-being. This is made feasible by analyzing multiple textual recordings over the course of pregnancy. By looking into how the pronoun usage changes during this significant time in a woman's life, the validity of the analysis could be increased.

Finally, the use of a multi-method approach, by combining longitudinal (examination of the same individuals at a specific time) and cross-sectional (examination of different individuals at a specific time) study designs, could enrich the current research (Glynn et al., 2004; Dunkel Schetter and Lobel, 2012; Schoch-Ruppen et al., 2018). This approach will make it possible to investigate whether maternal health and language use may vary depending on the stage of gestation. Developing a better understanding of the many pregnancy difficulties that may affect women's representations or assessments of their own selves as pregnancy progresses, will help significantly improve the research even further.

6 Conclusion

This research investigated the relationship between emotional expression, social comparison, and linguistics during pregnancy to provide a different perspective on the psychology underlying pregnancy. The absence of adequate research on this subject makes it challenging to identify how the insufficiency of intervention methods and medications for lack of social and psychological well-being during pregnancy impacts the mother's and the child's health (Schoch-Ruppen et al., 2018; Landoni et al., 2022). The theory that social comparison plays a significant role both during pregnancy and beyond is supported by prior studies (De Choudhury et al., 2013; De Choudhury and De, 2014; Schoch-Ruppen et al., 2018). However, the influence of social comparisons through social media in conjunction with psychological elements had not yet been studied.

The responses to three questionnaires and a textual inquiry about using social media while being pregnant were gathered from a survey published on Reddit communities. The linguistic characteristics of the textual entry were identified using LIWC-22. To address the main research question of this study, multiple linguistic categories of LIWC-22 were compared with three sub-scales: Comparison of Abilities (INCOM Sub-scale), Negative Affect (TPDS Sub-scale), and Social Support (GDPS Sub-scale). The findings of the research questions listed in table 15 are discussed and summarized further in this chapter.

Description	*Question*	*Results*
Research Question	What role do emotional expressions, social comparisons and social media usage play in the textual contributions that women disclose about their pregnancy experiences?	Answered in sections 2.1, 2.1.1, 4.1, 4.2 & 4.3
Sub-Question 1	What are women's emotional expressions indicating about their experience during pregnancy?	Answered in sections 2.4, 4.2.2 & 4.3
Sub-Question 2	What role do social comparisons play during pregnancy?	Answered in section 4.2.1 & 4.3
Sub-Question 3	What role do social networking sites play in assisting mothers during their pregnancy?	Answered in sections 2.3, 4.2.3 & 4.3

Table 15: Summary: Research Questions & Findings

As shown in sections 4.1 & 4.2, correlation and linear regression analyses were carried out to answer the main research question of this study, *"What role do emotional expressions, social comparisons and social media usage play in the textual contributions that women disclose about their pregnancy experiences?"*. The initial correlation analysis in section 4.1 found that the individual components present within a scale significantly correlated with each other. Also, there existed a positive correlation between *Comparison of Opinions (INCOM Sub-scale)* with *Antenatal Care (GDPS Sub-scale)*, and *Social (GDPS Sub-scale)*. The positive correlation also implies that one of the most important

predictors of prenatal nervousness and mental health problems symptoms is a lack of social and psychological support from one's spouse or wider group (Biaggi et al., 2016). Additionally, there existed a highly significant positive correlation of *Comparison of Abilities (INCOM Sub-scale)* with *Negative Affect (TPDS Sub-scale)*. This suggests that risk assessments made through social networking sites for opinions or skill comparisons are linked to feelings and biological stress responses, which are linked to recurrent physiological and psychological perturbation tendencies (Biaggi et al., 2016).

Furthermore, section 4.2 revealed the relationship between the selected LIWC categories and the three sub-scales using correlation and linear regression analysis. A few findings from this study related to previous studies, for example, the negative correlation of the psychological processes dimensions in LIWC-22 such as negative emotion, emotion, negative tone, anger, and sadness with Social Support indicates that socialization, supportive relationships, and positive associations are linked to lower levels of anxiety and depressive symptoms (De Choudhury and De, 2014). Further, the positive correlation between the psychological processes dimensions in LIWC-22 such as negative emotion, wellness, and anxiety with Comparison of Abilities (Suls and Wheeler, 2013; Friedman, 2011) is evidence that a distressing situation makes people more motivated to engage in social comparison to clear up any uncertainty concerning the risks. Finally, the positive correlation between the psychological processes dimensions in LIWC-22 such as negative emotion and anger with Negative Affect (Schoch-Ruppen et al., 2018). However, additional categories were significant as shown in table 14.

The first sub-question was used to identify the dominant linguistic categories in pregnant women's natural language to understand the role played by both positive and negative affect on pregnancy. From the correlation and linear regression analysis in 4.2.2, the psychological processes dimensions in LWIC-22 such as negative tone, emotional tone, linguistic dimensions, shehe, negative emotion, & anger as well as summary variables such as WPS, dictionary words, were all indicators of high Negative Affect (TPDS Sub-scale). The use of third-person singular pronouns in this study could indicate that women were concerned about the health of their unborn child or themselves and attempted to understand their experiences by evaluating themselves to others in their social networks. The responses of the participants in 4.3 highlighted the fact that many mothers disapproved of social media platforms since they portrayed pregnancy as a normal phenomenon. Additionally, many were unhappy about how inaccurate pregnancy advice was being distributed. These elements all contribute to Negative Affect (TPDS Sub-scale) during pregnancy effect.

The second sub-question aimed to explore the role played by social comparison during pregnancy. From the correlation and linear regression analysis in 4.2.1, the psychological processes dimensions such as negative emotion, anxiety, emotion, emotional tone & negative tone, linguistic dimensions, expanded dictionary variable wellness, and summary variables such as dictionary words, authentic in LIWC-22 were all indicators of people who place a great value on Comparison of Abilities (INCOM Sub-scale). It is evident that unexpected and upsetting situations may increase the significance of social compar-

ison's adaption and stress control functions. Finally, it was evident from the participants' responses in 4.3 that many mothers who use social networking sites compared their own experience to that of others to determine whether they are handling a problem skillfully, which is associated to Comparison of Abilities (INCOM Sub-scale).

Finally, the third sub-question aimed to explore the role played by social networking sites in assisting mothers during pregnancy. From the correlation and linear regression analysis in 4.2.3, the psychological processes dimensions such as negative emotion, emotion, negative tone, anger, and sadness have a negative correlation with Social Support (GDPS Sub-scale). As a result, these five linguistic categories serve as reliable measures of social support. It is clear from the negative correlation between the categories and Social Support that emotional contagion, a phenomenon in which one person's unpleasant experiences affect the other, may play a role in mothers' negative experiences. Finally, the examination of the participants' responses in 4.3 showed that many first-time mothers found it useful to use social media to look for various health-related advice and information. To determine whether they are handling a problem well, they compared their own experience with that of others. Some first-time mothers thought that certain social media forums were full of negative, ineffectual argument that encouraged negative pregnancy emotions and depicted pregnancy as "normal." Despite feeling more confident during their second pregnancy, the majority of women who were having their second or subsequent pregnancies said they used social media for peer support.However, some second or subsequent time pregnant women expressed discontent, because they were worried about their physical changes and the unavoidable comparisons that would follow. Pregnant participants who experienced problems tended to turn to social media for peer support. A few participants who experienced complications, however, stated that using social media made it even harder for the participants because there is a lot of inaccurate information and suggestions for such problems, which adds to the already negative emotions connected to pregnancy-related complications.

The World Health Organization's recommendations for prenatal and postpartum care highlight the importance of social and psychological factors involved in promoting the child's better and healthier growth along with the mother's general convalescence and overall health (WHO, 2022). Additionally, encouraging the use of online networks for the provision of healthcare has emerged as a major objective for legislators, academicians, and healthcare professionals. Prenatal knowledge often covers the physiological mechanisms of fetal development, labor, and delivery. What about the developments that are taking place on a social and psychological level? Therefore, considering the general inadequacy of such information in the domain of pregnancy care and the imminent transition to digital care, the findings of this study could make a significant contribution to social and psychological research.

Bibliography

Adewuya, A. O., Ola, B. A., Aloba, O. O., Dada, A. O., and Fasoto, O. O. (2007). Prevalence and correlates of depression in late pregnancy among nigerian women. *Depression and anxiety*, 24(1):15–21.

Allen, S. M. and Hawkins, A. J. (1999). Maternal gatekeeping: Mothers' beliefs and behaviors that inhibit greater father involvement in family work. *Journal of Marriage and the Family*, pages 199–212.

Anderson, C., Kraus, M. W., Galinsky, A. D., and Keltner, D. (2012). The local-ladder effect: Social status and subjective well-being. *Psychological science*, 23(7):764–771.

Atkinson, L., Shaw, R. L., and French, D. P. (2016). Is pregnancy a teachable moment for diet and physical activity behaviour change? an interpretative phenomenological analysis of the experiences of women during their first pregnancy. *British journal of health psychology*, 21(4):842–858.

Bajo, M., Stavraki, M., Blanco, A., and Díaz, D. (2021). Direct versus indirect well-being measures: Using partially structured stimuli to evaluate well-being. *Journal of Happiness Studies*, 22(6):2575–2598.

Bandura, A. (1997). Self-efficacy: The exercise of control worth publishers. *Berman, P., & McLaughlin, MW (1978). Federal programs supporting educational*.

Bergant, A., Moser, R., Heim, K., and Ulmer, H. (1998). Burden of childbirth. *Archives of Women's Mental Health*, 1(2):77–81.

Bers, M. U., Beals, L. M., Chau, C., Satoh, K., Blume, E. D., DeMaso, D. R., and Gonzalez-Heydrich, J. (2010). Use of a virtual community as a psychosocial support system in pediatric transplantation. *Pediatric transplantation*, 14(2):261–267.

Bharti, U., Bajaj, D., Batra, H., Lalit, S., Lalit, S., and Gangwani, A. (2020). Medbot: Conversational artificial intelligence powered chatbot for delivering tele-health after covid-19. In *2020 5th international conference on communication and electronics systems (ICCES)*, pages 870–875. IEEE.

Biaggi, A., Conroy, S., Pawlby, S., and Pariante, C. M. (2016). Identifying the women at risk of antenatal anxiety and depression: a systematic review. *Journal of affective disorders*, 191:62–77.

Bokolo, A. J. (2021). Exploring the adoption of telemedicine and virtual software for care of outpatients during and after covid-19 pandemic. *Irish Journal of Medical Science (1971-)*, 190(1):1–10.

Boyd, R. L. (2017). Psychological text analysis in the digital humanities. In *Data analytics in digital humanities*, pages 161–189. Springer.

Boyd, R. L., Ashokkumar, A., Seraj, S., and Pennebaker, J. W. (2022). The development and psychometric properties of liwc-22. *Austin, TX: University of Texas at Austin*.

Boyd, R. L., Blackburn, K. G., and Pennebaker, J. W. (2020). The narrative arc: Revealing core narrative structures through text analysis. *Science advances*, 6(32):eaba2196.

Brandon, A. R., Trivedi, M. H., Hynan, L. S., Miltenberger, P. D., Labat, D. B., Rifkin, J. B., and Stringer, C. A. (2008). Prenatal depression in women hospitalized for obstetric risk. *The Journal of clinical psychiatry*, 69(4):15271.

Brazelton, T. B. and Cramer, B. G. (2018). *The earliest relationship: Parents, infants, and the drama of early attachment*. Routledge.

Buchanan, L., Anderson, E., MBiostat, H. X., Phongsavan, P., Rissel, C., and Wen, L. M. (2021). Sources of information and the use of mobile applications for health and parenting information during pregnancy: Implications for health promotion. *Health informatics journal*, 27(3):14604582211043146.

Buunk, A. P. and Gibbons, F. X. (2006). Social comparison orientation: A new perspective on those who do and those who don't compare with others.

Buunk, B. P. and Ybema, J. F. (1997). Social comparisons and occupational stress: The identification-contrast model. *Health, coping, and well-being: Perspectives from social comparison theory*, pages 359–388.

Caparros-Gonzalez, R. A., Perra, O., Alderdice, F., Lynn, F., Lobel, M., García-García, I., and Peralta-Ramírez, M. I. (2019). Psychometric validation of the prenatal distress questionnaire (pdq) in pregnant women in spain. *Women & health*, 59(8):937–952.

Caverly, S. T. (2019). The role of social comparisons in perceived parental competence, mental health, and relationship satisfaction.

Chae, J. (2015). "am i a better mother than you?" media and 21st-century motherhood in the context of the social comparison theory. *Communication Research*, 42(4):503–525.

Chiu, Y.-C. and Hsieh, Y.-L. (2013). Communication online with fellow cancer patients: Writing to be remembered, gain strength, and find survivors. *Journal of health psychology*, 18(12):1572–1581.

Civitci, N. and Civitci, A. (2015). Social comparison orientation, hardiness and life satisfaction in undergraduate students. *Procedia-Social and Behavioral Sciences*, 205:516–523.

Cordova, M. J., Cunningham, L. L., Carlson, C. R., and Andrykowski, M. A. (2001). Social constraints, cognitive processing, and adjustment to breast cancer. *Journal of consulting and clinical psychology*, 69(4):706.

Coulson, N. S. (2013). How do online patient support communities affect the experience of inflammatory bowel disease? an online survey. *JRSM short reports*, 4(8):2042533313478004.

Coyne, S. M., McDaniel, B. T., and Stockdale, L. A. (2017). "do you dare to compare?" associations between maternal social comparisons on social networking sites and parenting, mental health, and romantic relationship outcomes. *Computers in Human Behavior*, 70:335–340.

Cunningham, F. G., Leveno, K. J., Bloom, S. L., Spong, C. Y., and Dashe, J. S. (2014). *Williams obstetrics, 24e*. Mcgraw-hill New York, NY, USA.

De Choudhury, M., Counts, S., and Horvitz, E. (2013). Social media as a measurement tool of depression in populations. In *Proceedings of the 5th annual ACM web science conference*, pages 47–56.

De Choudhury, M., Counts, S., and Horvitz, E. (2014a). How social information networks reflect major life events: Case of childbirth.

De Choudhury, M., Counts, S., Horvitz, E. J., and Hoff, A. (2014b). Characterizing and predicting postpartum depression from shared facebook data. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing*, pages 626–638.

De Choudhury, M. and De, S. (2014). Mental health discourse on reddit: Self-disclosure, social support, and anonymity. In *Eighth international AAAI conference on weblogs and social media*.

Devlin, J., Chang, M.-W., Lee, K., and Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. *arXiv preprint arXiv:1810.04805*.

Dijkstra, P., Kuyper, H., Van der Werf, G., Buunk, A. P., and van der Zee, Y. G. (2008). Social comparison in the classroom: A review. *Review of educational research*, 78(4):828–879.

Duncan, L. G. and Bardacke, N. (2010). Mindfulness-based childbirth and parenting education: promoting family mindfulness during the perinatal period. *Journal of Child and Family Studies*, 19(2):190–202.

Dunkel Schetter, C. (2011). Psychological science on pregnancy: stress processes, biopsychosocial models, and emerging research issues. *Annual review of psychology*, 62:531–558.

Dunkel Schetter, C. and Lobel, M. (2012). Pregnancy and birth outcomes: A multilevel analysis of prenatal maternal stress and birth weight.

Edvardsson, K., Ivarsson, A., Eurenius, E., Garvare, R., Nyström, M. E., Small, R., and Mogren, I. (2011). Giving offspring a healthy start: parents' experiences of health promotion and lifestyle change during pregnancy and early parenthood. *BMC public health*, 11(1):1–13.

Ertuğrul, M., Okumuş, H., Aluş Tokat, M., and Bektaş, M. (2015). Psychometric evaluation of the tilburg pregnancy distress scale–turkish version (tpds-t). *Journal of Transcultural Nursing*, 26(5):499–506.

Fenwick, J., Gamble, J., Nathan, E., Bayes, S., and Hauck, Y. (2009). Pre-and postpartum levels of childbirth fear and the relationship to birth outcomes in a cohort of australian women. *Journal of clinical nursing*, 18(5):667–677.

Festinger, L. (1954). A theory of social comparison processes. *Human relations*, 7(2):117–140.

Ford, E. A., Roman, S. D., McLaughlin, E. A., Beckett, E. L., and Sutherland, J. M. (2020). The association between reproductive health smartphone applications and fertility knowledge of australian women. *BMC women's health*, 20(1):1–10.

Fraiberg, S., Adelson, E., and Shapiro, V. (2003). Ghosts in the nursery. a psychoanalytic approach to the problems of impaired infant-mother relationships. *Parent-infant psychodynamics: Wild things, mirrors and ghosts*, 87:117.

Friedman, H. S. (2011). *The Oxford handbook of health psychology*. Oxford University Press.

Gerber, J., Wheeler, L., and Suls, J. (2018). A social comparison theory meta-analysis 60+ years on. *Psychological bulletin*, 144(2):177.

Gibbons, F. X. and Buunk, B. P. (1999). Individual differences in social comparison: development of a scale of social comparison orientation. *Journal of personality and social psychology*, 76(1):129.

Glynn, L. M., Schetter, C. D., Wadhwa, P. D., and Sandman, C. A. (2004). Pregnancy affects appraisal of negative life events. *Journal of psychosomatic research*, 56(1):47–52.

Gonzalez, C., Ramirez, M., Diaz, A., Duran, M., and Areán, P. (2021). Expanding virtual postpartum mental health care for latina women: a participatory research and policy agenda. *Women's Health Issues*, 31(2):96–99.

Gordon, B. F. (1966). Influence and social comparison as motives for affiliation. *Journal of Experimental Social Psychology*, 1:55–65.

Grant, K.-A., McMahon, C., and Austin, M.-P. (2008). Maternal anxiety during the transition to parenthood: a prospective study. *Journal of affective disorders*, 108(1-2):101–111.

Hakmiller, K. L. (1966). Threat as a determinant of downward comparison. *Journal of experimental social psychology*, 1:32–39.

Hansen, T. (2012). Parenthood and happiness: A review of folk theories versus empirical evidence. *Social indicators research*, 108(1):29–64.

Harnoune, A., Rhanoui, M., Mikram, M., Yousfi, S., Elkaimbillah, Z., and El Asri, B. (2021). Bert based clinical knowledge extraction for biomedical knowledge graph construction and analysis. *Computer Methods and Programs in Biomedicine Update*, 1:100042.

Hewitt, C., Gilbody, S., Brealey, S., Paulden, M., Palmer, S., Mann, R., Green, J., Morrell, J., Barkham, M., Light, K., et al. (2009). Methods to identify postnatal depression in primary care: an integrated evidence synthesis and value of information analysis. *Health Technology Assessment (Winchester, England)*, 13(36):1–145.

Hiremath, P. (2016). Need for psychological assessment during pregnancy-a nursing perspective. *Glob J Nurs Forensic Stud [Internet]*, 1(7):1–4.

Holmes, T. H. and Rahe, R. H. (1967). The social readjustment rating scale. *Journal of psychosomatic research*.

Hyman, H. H. (1942). The psychology of status. *Archives of Psychology (Columbia University)*.

Jackson, R. A., Stotland, N. E., Caughey, A. B., and Gerbert, B. (2011). Improving diet and exercise in pregnancy with video doctor counseling: a randomized trial. *Patient education and counseling*, 83(2):203–209.

Jomeen, J. (2004). The importance of assessing psychological status during pregnancy, childbirth and the postnatal period as a multidimensional construct: A literature review. *Clinical Effectiveness in Nursing*, 8(3-4):143–155.

Kramer, A. D., Guillory, J. E., and Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences*, 111(24):8788–8790.

Kuipers, J., Henrichs, J., and Evans, K. (2020). A comparison of the fear of childbirth scale with the tilburg pregnancy distress scale to identify childbirth-related fear in a sample of dutch pregnant women: a diagnostic accuracy comparative cross-sectional study. *International Journal of Nursing Studies*, 109:103615.

La Marca-Ghaemmaghami, P., Dainese, S. M., Stalla, G., Haller, M., Zimmermann, R., and Ehlert, U. (2017). Second-trimester amniotic fluid corticotropin-releasing hormone and urocortin in relation to maternal stress and fetal growth in human pregnancy. *Stress*, 20(3):231–240.

Lakey, B. and Cohen, S. (2000). Social support theory and measurement.

Landoni, M., Silverio, S. A., Ciuffo, G., Daccò, M., Petrovic, M., Di Blasio, P., and Ionio, C. (2022). Linguistic features of postpartum depression using linguistic inquiry and word count text analysis. *Journal of Neonatal Nursing*.

Lazarus, R. S. and Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.

Li, Y., Wang, X., Lin, X., and Hajli, M. (2018). Seeking and sharing health information on social media: A net valence model and cross-cultural comparison. *Technological Forecasting and Social Change*, 126:28–40.

Lindqvist, M., Lindkvist, M., Eurenius, E., Persson, M., and Mogren, I. (2017). Change of lifestyle habits–motivation and ability reported by pregnant women in northern sweden. *Sexual & Reproductive HealthCare*, 13:83–90.

Liss, M., Schiffrin, H. H., Mackintosh, V. H., Miles-McLean, H., and Erchull, M. J. (2013). Development and validation of a quantitative measure of intensive parenting attitudes. *Journal of Child and Family Studies*, 22(5):621–636.

Liu, X., Wang, S., and Wang, G. (2021). Prevalence and risk factors of postpartum depression in women: A systematic review and meta-analysis. *Journal of clinical nursing*.

Lobel, M. and Schetter, C. D. (2016). Pregnancy and prenatal stress.

Lupien, S. J., McEwen, B. S., Gunnar, M. R., and Heim, C. (2009). Effects of stress throughout the lifespan on the brain, behaviour and cognition. *Nature reviews neuroscience*, 10(6):434–445.

Maier, K. J., Waldstein, S. R., and Synowski, S. J. (2003). Relation of cognitive appraisal to cardiovascular reactivity, affect, and task engagement. *Annals of Behavioral Medicine*, 26(1):32–41.

Mann, D. M., Chen, J., Chunara, R., Testa, P. A., and Nov, O. (2020). Covid-19 transforms health care through telemedicine: evidence from the field. *Journal of the American Medical Informatics Association*, 27(7):1132–1135.

Mares, S., Newman, L. K., and Warren, B. (2011). *Clinical skills in infant mental health: The first three years*. Aust Council for Ed Research.

Marsh, H. W. and Parker, J. W. (1984). Determinants of student self-concept: Is it better to be a relatively large fish in a small pond even if you don't learn to swim as well? *Journal of personality and social psychology*, 47(1):213.

Mashegoane, S. and Bambo, S. C. (2021). Validation of the tilburg pregnancy distress scale among pregnant women in capricorn district, south africa. *Journal of Reproductive and Infant Psychology*, pages 1–12.

Mattson, M. and Hall, J. G. (2011). *Health as communication nexus: A service-learning approach*. Kendall Hunt Publishing Company.

Matvienko-Sikar, K. and Dockray, S. (2017). Effects of a novel positive psychological intervention on prenatal stress and well-being: A pilot randomised controlled trial. *Women and Birth*, 30(2):e111–e118.

McBride, C. M., Emmons, K. M., and Lipkus, I. M. (2003). Understanding the potential of teachable moments: the case of smoking cessation. *Health education research*, 18(2):156–170.

Meeussen, L. and Van Laar, C. (2018). Feeling pressure to be a perfect mother relates to parental burnout and career ambitions. *Frontiers in psychology*, page 2113.

Meireles, J. F. F., Neves, C. M., Carvalho, P. H. B. d., and Ferreira, M. E. C. (2015). Body dissatisfaction among pregnant women: an integrative review of the literature. *Ciencia & Saude Coletiva*, 20:2091–2103.

Minor, K. S., Bonfils, K. A., Luther, L., Firmin, R. L., Kukla, M., MacLain, V. R., Buck, B., Lysaker, P. H., and Salyers, M. P. (2015). Lexical analysis in schizophrenia: how emotion and social word use informs our understanding of clinical presentation. *Journal of psychiatric research*, 64:74–78.

Molgora, S., Fenaroli, V., and Saita, E. (2020). The association between childbirth experience and mother's parenting stress: The mediating role of anxiety and depressive symptoms. *Women & Health*, 60(3):341–351.

Molleman, E., Pruyn, J., and Van Knippenberg, A. (1986). Social comparison processes among cancer patients. *British Journal of Social Psychology*, 25(1):1–13.

Morales, M. R. and Levitan, R. (2016). Speech vs. text: A comparative analysis of features for depression detection systems. In *2016 IEEE spoken language technology workshop (SLT)*, pages 136–143. IEEE.

O'Connell, M. A., Leahy-Warren, P., Khashan, A. S., Kenny, L. C., and O'Neill, S. M. (2017). Worldwide prevalence of tocophobia in pregnant women: systematic review and meta-analysis. *Acta obstetricia et gynecologica Scandinavica*, 96(8):907–920.

Orsillo, S. M., Batten, S. V., Plumb, J. C., Luterek, J. A., and Roessner, B. M. (2004). An experimental study of emotional responding in women with posttraumatic stress disorder related to interpersonal violence. *Journal of traumatic stress*, 17(3):241–248.

O'Leary, K., Dockray, S., and Hammond, S. (2016). Positive prenatal well-being: conceptualising and measuring mindfulness and gratitude in pregnancy. *Archives of women's mental health*, 19(4):665–673.

Pennebaker, J. W. (1997). Writing about emotional experiences as a therapeutic process. *Psychological science*, 8(3):162–166.

Pennebaker, J. W. and Booth, R. (2007). Linguistic inquiry and word count: Liwc [computer software]. austin, tx: Liwc. net. pennebaker, jw, & francis, me (1996). cognitive, emotional, and language processes in disclosure. *Cognition and Emotion*, 10:601–626.

Pennebaker, J. W., Mehl, M. R., and Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual review of psychology*, 54(1):547–577.

Pennebaker, K. (1999). Pennebaker jw, king la. *Linguistic styles: Language use as an individual difference, Journal of Personality and Social Psychology*, 77(6):1296–1312.

Phelan, S. (2010). Pregnancy: a "teachable moment" for weight control and obesity prevention. *American journal of obstetrics and gynecology*, 202(2):135–e1.

Phillips, N. and Broderick, A. (2014). Has mumsnet changed me? sns influence on identity adaptation and consumption. *Journal of Marketing Management*, 30(9-10):1039–1057.

Pop, V. J., Pommer, A. M., Pop-Purceleanu, M., Wijnen, H. A., Bergink, V., and Pouwer, F. (2011). Development of the tilburg pregnancy distress scale: the tpds. *BMC pregnancy and childbirth*, 11(1):1–8.

Pratami, E., Sukesi, S., Husni, E., and Nursalam, N. (2021). The behavioral model development of pregnant women in accordance to pregnancy treatment lifestyle. *Clinical Epidemiology and Global Health*, 12:100802.

Rivis, A., Sheeran, P., and Armitage, C. J. (2011). Intention versus identification as determinants of adolescents' health behaviours: evidence and correlates. *Psychology & Health*, 26(9):1128–1142.

Rude, S., Gortner, E.-M., and Pennebaker, J. (2004). Language use of depressed and depression-vulnerable college students. *Cognition & Emotion*, 18(8):1121–1133.

Sailunaz, K., Dhaliwal, M., Rokne, J., and Alhajj, R. (2018). Emotion detection from text and speech: a survey. *Social Network Analysis and Mining*, 8(1):1–26.

Schachter, S. (1959). The psychology of affiliation: Experimental studies of the sources of gregariousness.

Schetter, C. D. (2009). Stress processes in pregnancy and preterm birth. *Current Directions in Psychological Science*, 18(4):205–209.

Schoch-Ruppen, J., Ehlert, U., Uggowitzer, F., Weymerskirch, N., and La Marca-Ghaemmaghami, P. (2018). Women's word use in pregnancy: associations with maternal characteristics, prenatal stress, and neonatal birth outcome. *Frontiers in Psychology*, 9:1234.

Seabrook, E. M., Kern, M. L., and Rickard, N. S. (2016). Social networking sites, depression, and anxiety: a systematic review. *JMIR mental health*, 3(4):e5842.

Setoyama, Y., Yamazaki, Y., Namayama, K., et al. (2011). Benefits of peer support in online japanese breast cancer communities: differences between lurkers and posters. *Journal of medical Internet research*, 13(4):e1696.

Settanni, M. and Marengo, D. (2015). Sharing feelings online: studying emotional well-being via automated text analysis of facebook posts. *Frontiers in psychology*, 6:1045.

Sherif, M. (1936). The psychology of social norms.

Singer, J. E. and Shockley, V. L. (1965). Ability and affiliation. *Journal of Personality and Social Psychology*, 1(1):95.

Skouteris, H. (2012). Pregnancy: Physical and body image changes. *Encyclopedia of body image and human appearance*, pages 664–668.

Smailhodzic, E., Hooijsma, W., Boonstra, A., and Langley, D. J. (2016). Social media use in healthcare: a systematic review of effects on patients and on their relationship with healthcare professionals. *BMC health services research*, 16(1):1–14.

Stern, D. N. (1991). Maternal representations: A clinical and subjective phenomenological view. *Infant Mental Health Journal*, 12(3):174–186.

Stern, D. N. (2020). *The motherhood constellation: A unified view of parent-infant psychotherapy.* Routledge.

Stirman, S. W. and Pennebaker, J. W. (2001). Word use in the poetry of suicidal and nonsuicidal poets. *Psychosomatic medicine*, 63(4):517–522.

Suls, J., Martin, R., and Wheeler, L. (2000). Three kinds of opinion comparison: The triadic model. *Personality and Social Psychology Review*, 4(3):219–237.

Suls, J., Martin, R., and Wheeler, L. (2002). Social comparison: Why, with whom, and with what effect? *Current directions in psychological science*, 11(5):159–163.

Suls, J. and Wheeler, L. (2013). *Handbook of social comparison: Theory and research.* Springer Science & Business Media.

Symes, E. (2017). The transition to motherhood: Psychological factors associated with pregnancy, labour and birth. *Psych: The Bulletin of the Australian Psychological Society Ltd*, 39.

Tani, F. and Castagna, V. (2017). Maternal social support, quality of birth experience, and post-partum depression in primiparous women. *The Journal of Maternal-Fetal & Neonatal Medicine*, 30(6):689–692.

Tausczik, Y. R. and Pennebaker, J. W. (2010). The psychological meaning of words: Liwc and computerized text analysis methods. *Journal of language and social psychology*, 29(1):24–54.

Taylor, S. E. and Lobel, M. (1989). Social comparison activity under threat: downward evaluation and upward contacts. *Psychological review*, 96(4):569.

Taylor, S. E., Wayment, H. A., and Carrillo, M. (1996). Social comparison, self-regulation, and motivation.

Tennen, H., Mckee, T. E., and Affleck, G. (2000). Social comparison processes in health and illness. In *Handbook of social comparison*, pages 443–483. Springer.

Tikkanen, R., Gunja, M. Z., FitzGerald, M., and Zephyrin, L. (2020). Maternal mortality and maternity care in the united states compared to 10 other developed countries. *The Commonwealth Fund*, 10.

Umoh, U. and Nyoho, E. (2015). A fuzzy intelligent framework for healthcare diagnosis and monitoring of pregnancy risk factor in women. *Journal of Health. Medicine and Nursing*, 18:97–112.

Velupillai, S., Suominen, H., Liakata, M., Roberts, A., Shah, A. D., Morley, K., Osborn, D., Hayes, J., Stewart, R., Downs, J., et al. (2018). Using clinical natural language processing for health outcomes research: overview and actionable suggestions for future advances. *Journal of biomedical informatics*, 88:11–19.

Volpato, L. K., Siqueira, D. C., Nunes, R. D., Ghizzo Filho, J., and Traebert, J. (2019). Transcultural adaptation and validation of the tilburg pregnancy distress scale (tpds) in the brazilian cultural context. *Midwifery*, 75:97–102.

Walker, L. O., Gao, J., and Xie, B. (2015). Postpartum psychosocial and behavioral health: A systematic review of self-administered scales validated for postpartum women in the united states. *Women's Health Issues*, 25(5):586–600.

Walker, R., Blumfield, M., and Truby, H. (2018). Beliefs and advice-seeking behaviours for fertility and pregnancy: a cross-sectional study of a global sample. *Journal of Human Nutrition and Dietetics*, 31(4):486–495.

Walker, R. E., Choi, T. S., Quong, S., Hodges, R., Truby, H., and Kumar, A. (2020). "it's not easy"—a qualitative study of lifestyle change during pregnancy. *Women and Birth*, 33(4):e363–e370.

Watson, B., Fuller-Tyszkiewicz, M., Broadbent, J., and Skouteris, H. (2015). The meaning of body image experiences during the perinatal period: A systematic review of the qualitative literature. *Body image*, 14:102–113.

Wheeler, L. (1966). Motivation as a determinant of upward comparison. *Journal of Experimental Social Psychology*, 1:27–31.

Wheeler, L., Martin, R., and Suls, J. (1997). The proxy model of social comparison for self-assessment of ability. *Personality and Social Psychology Review*, 1(1):54–61.

WHO (2022). Who urges quality care for women and newborns in critical first weeks after childbirth. https://www.who.int/news/item/30-03-2022-who-urges-quality-care-for-women-and-newborns-in-critical-first-weeks-after-childbi

Wills, T. A. (1981). Downward comparison principles in social psychology. *Psychological bulletin*, 90(2):245.

Withers, M., Kharazmi, N., and Lim, E. (2018). Traditional beliefs and practices in pregnancy, childbirth and postpartum: A review of the evidence from asian countries. *Midwifery*, 56:158–170.

Wood, J. V., Taylor, S. E., and Lichtman, R. R. (1985). Social comparison in adjustment to breast cancer. *Journal of personality and social psychology*, 49(5):1169.

Woods, S. M., Melville, J. L., Guo, Y., Fan, M.-Y., and Gavin, A. (2010). Psychosocial stress during pregnancy. *American journal of obstetrics and gynecology*, 202(1):61–e1.

Wu, H., Sun, W., Chen, H., Wu, Y., Ding, W., Liang, S., Huang, X., Chen, H., Zeng, Q., Li, Z., et al. (2021). Health-related quality of life in different trimesters during pregnancy. *Health and Quality of Life Outcomes*, 19(1):1–11.

Ybema, J. F. and Buunk, B. P. (1995). Affective responses to social comparison: A study among disabled individuals. *British Journal of Social Psychology*, 34(3):279–292.

Zell, E. and Alicke, M. D. (2010). The local dominance effect in self-evaluation: Evidence and explanations. *Personality and Social Psychology Review*, 14(4):368–384.

Zimbardo, P. G. and Leippe, M. R. (1991). *The psychology of attitude change and social influence.* Mcgraw-Hill Book Company.

A Initial Reddit Group Selection

Sub-Reddit Groups	No. of Members (In Thousands)	Group Description
Reddit Parenting	4400	Parenting is the place to discuss the ins and out as well as ups and downs of child-rearing. From the early stages of pregnancy to when your teenagers are finally ready to leave the nest (even if they don't want to) we're here to help you through this crazy thing called parenting.
Mommit	515	We are moms mucking through the ickier parts of child raising. It may not always be pretty, fun and awesome, but we do it. We want to be here for other moms who are going through the same experiences and offer a helping hand.
Baby Bumps Graduates	482	A place for new parents, new parents to be, and old parents who want to help out. Posts focusing on the transition into living with your new little one and any issues that may come up. Ranting and gushing is welcome!
Baby Bumps	307	A place for pregnant redditors, those who have been pregnant, those who wish to be in the future, and anyone who supports them.
Pregnant	128	A safer space for all pregnant people.
Fit Pregnancy	25.7	An inclusive space to discuss fitness and pregnancy - pre-natal, during, and post-partum. Geared towards motivating and inspiring pregnant people to stay healthy and fit throughout.
CautiousBB	11	For cautious pregnant Mommas on this great perilous journey to motherhood.

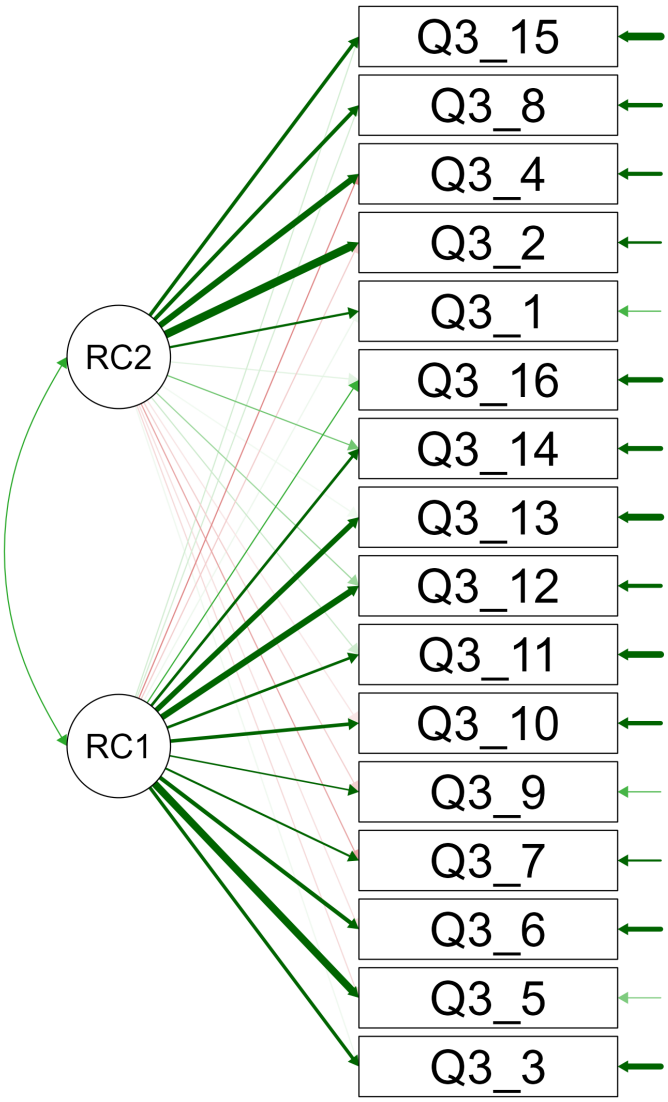
Table 16: Pregnancy Related Sub-Reddit Groups

B Reddit Approval Status

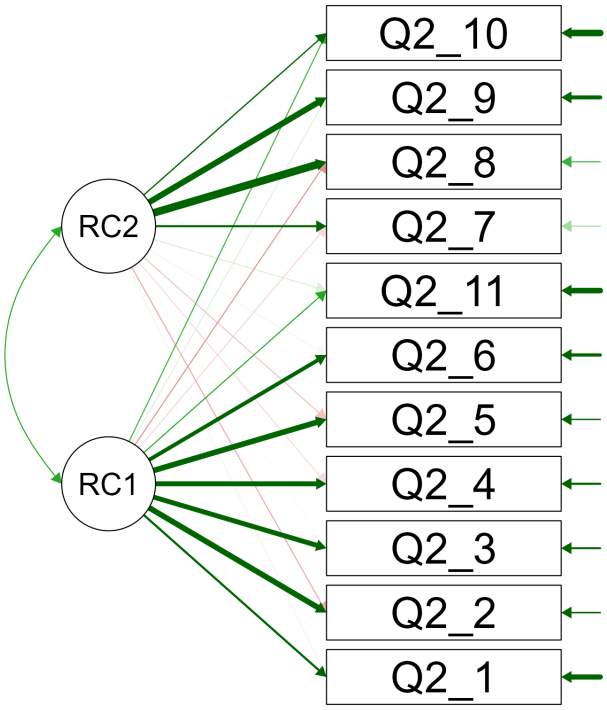
Reddit Group	Approval Status	Reddit Group	Approval Status	Reddit Group	Approval Status
women	Granted	AsianParentStories	Not Granted	newborns	Decision Pending
ABCDesis	Granted	India	Not Granted	sleeptrain	Decision Pending
KetoBabies	Granted	oneanddone	Not Granted	Newborn	Decision Pending
beyondthebump	Granted	multilingualparenting	Not Granted	GivingBirth	Decision Pending
Assistance	Granted	science	Not Granted	tryingforanother	Decision Pending
nursing	Granted	NewParents	Not Granted	workingmoms	Decision Pending
NICUParents	Granted	Twins	Not Granted	sensualpregnantbirth	Decision Pending
BabyBumpsandBeyondAu	Granted	MomForAMinute	Not Granted	weightlossafterbaby	Decision Pending
GestationalDiabetes	Granted			postpartumdepression	Decision Pending
breastfeedingsupport	Granted			Postpartum_Anxiety	Decision Pending
toddlers	Granted			Postpartum_Depression	Decision Pending
fitpregnancy	Granted			InfertilityBabies	Decision Pending
ParentingThruTrauma	Granted			BabyBumpsCanada	Decision Pending
ScienceBasedParenting	Granted			IVF	Decision Pending
Mommit	Granted			PlusSizedAndPregnant	Decision Pending
SampleSize	Granted			pregnancyproblems	Decision Pending
				FitMama	Decision Pending
				postpartumprogress	Decision Pending
				FormulaFeeders	Decision Pending
				babywearing	Decision Pending
				ParentingInBulk	Decision Pending
				Motherhood	Decision Pending
				PregnancyUK	Decision Pending
				breakingmom	Decision Pending
				BabyBumps	Decision Pending
				beyondbaby	Decision Pending
				pregnant	Decision Pending
				CautiousBB	Decision Pending

Table 17: List of Sub-Reddit Groups

C Path Diagram - Tilburg Pregnancy Distress Scale



D Path Diagram - INCOM Scale



E Path Diagram - Gratitude During Pregnancy Scale