Creating Healthier Social Media Environments: Integrating Evolutionary Psychology and Persuasive Technology

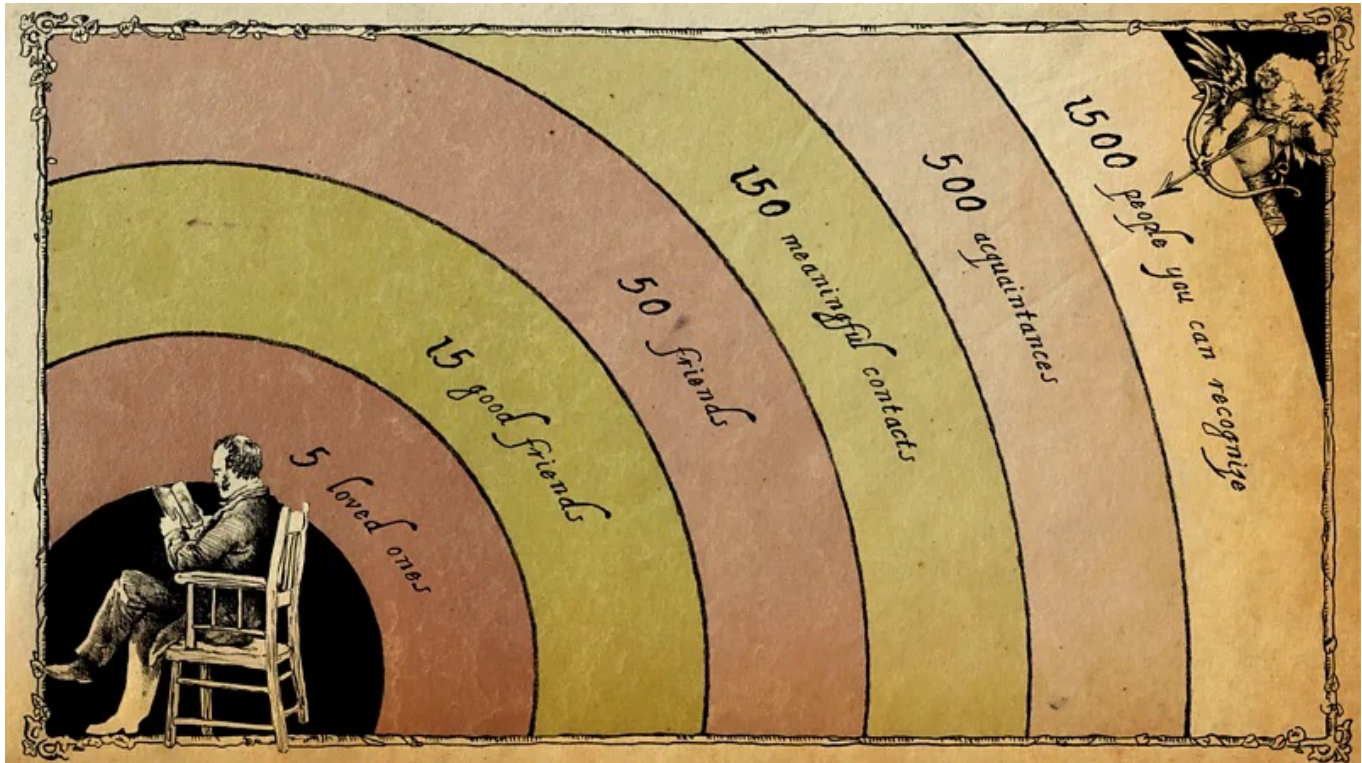DANIEL NICOARA, University of Twente, The Netherlands

Fig. 1. The most intimate circle is just five loved ones, reaching a maximum of 1500 people you can recognise

The rapid development of social media has brought new bases into human interaction, communication, and self-representation. Although these platforms confer multiple advantages, they also pose significant risks to users' mental health and well-being due to evolutionary mismatches. This paper considers the nature of evolutionary mismatch in the context of social media: the differences between our evolved psychological mechanisms and the demands of the modern digital environment. This thesis integrates insights from the discipline of evolutionary psychology with those from persuasive technology into a set of guidelines for designing social media services that help, rather than hinder, human well-being and positive social interaction. The practical problems are thus derived, based on the principles of persuasive technology, to minimize the harmful impacts added by the evolved mismatches. Hopefully, these guidelines will help developers working on social media in their endeavors toward creating environments that serve the interests of individual well-being and meaningful social connection.

1 INTRODUCTION

Social media has been at the forefront of altering human interaction: how people communicate, form relations, and view themselves.. In this thesis work, an attempt has been made to localize these mismatches within social media and propose solutions to mitigate their impact on mental health and well-being.

Human psychological mechanisms were designed in ancestral environments far removed from those of today's digital world. What governments ban or censor enters into vast personal networks, but the curated content is overwhelming for cognitive mechanisms designed for smaller social groups. The result can be negative emotions and psychological stress resulting from constant comparisons with others due to unreal, unattainable standards and requirements for perfect image maintenance online.

These focal areas include social comparison and self-esteem, social status and reproductive decisions, communication, mating dynamics, eating disorders, emotional manipulation, chronic stress,

ephemerality and permanence, influencer culture, and finally, intensity of social media use. Each of the above focal areas shall investigate specific mismatches herein, their consequences, and potential solutions master-minded with persuasive technology principles.

Integrating evolutionary psychology with computer science, the following are a few proposed features of the thesis for healthier social media design guidelines: Social connection prompts, gratitude tools, balanced content recommendations, features related to time management, and network size limitations. It has used specific interventions to promote well-being and reduce anxiety and depression by fostering positive social interactions.

In summary, exploiting evolutionary mismatches in social media design is quite relevant to mental health and well-being. We can use persuasive technology coupled with evolutionary psychology to develop digital milieus that set a positive experience and interactions for users. Future work shall empirically validate these guidelines, looking into their long-term impact on user well-being.

2 LITERATURE REVIEW

Evolutionary mismatches occur when modern environments differ significantly from those in which human psychological mechanisms evolved. Social media platforms often exacerbate these mismatches, leading to various negative outcomes [12]. This section summarizes key features of social media that create evolutionary mismatches and their associated impacts.

2.1 Social Comparison and Self-Esteem

2.1.1 The Evolutionary Mismatch. Social media platforms enable users to create profiles, share content, and interact. This often leads to social comparison—the process of evaluating oneself relative to others, which can harm self-esteem, defined as one's overall sense of personal value or worth [1]. Human brains evolved to compare themselves within small, local groups of around 150 people (Dunbar's number) [3]. Social media, however, exposes users to much larger networks, creating an evolutionary mismatch since we are not equipped to handle such extensive social information [12].

For example, on Facebook, a user with 500 friends can see numerous curated posts in one session, showcasing vacations, promotions, or milestones—an unrealistic social exposure compared to pre-social media environments.

2.1.2 Negative Consequences and Solutions. These factors can lower self-esteem, increase anxiety and depression, and worsen body image issues. Users may feel inadequate compared to filtered selfies or friends' success stories and feel pressured to present a perfect online image [1, 9, 15]. To address this mismatch, we can apply principles of persuasive technology:

- **Social Connection Prompts:** Design algorithms suggesting meaningful offline connections based on shared interests or events. For example, if friends are interested in a new restaurant, the platform could prompt them to plan a visit together [12].
- **Gratitude and Reflection Tools:** Features encouraging users to reflect on positive real-life relationships. Weekly

prompts could ask users to share gratitude moments, emphasizing in-person connections over online comparisons [1].
- **Balanced Content Recommendations:** Algorithms prioritizing authentic experiences and real-world interactions over idealized posts, creating a realistic social media environment [9].
- **Time Management Features:** Tools allowing users to set goals for balancing online and offline time. For example, setting daily social media limits with reminders to engage face-to-face [11].
- **Limiting Network Sizes:** Implementing a maximum network size of 150 people to align with Dunbar's number. This approach would help users maintain manageable and meaningful social circles, reducing the overwhelming social comparisons typical of larger networks.

2.1.3 Guidelines for Healthier Social Media Design. Consider these guidelines when designing social media platforms to mitigate negative social comparison:

- **Transparency:** Inform users that content may be edited or selectively shared, and add labels to heavily filtered images.
- **Balanced Content:** Design algorithms providing a mix of content, not just the most engaging or idealized posts.
- **Positive Interaction Focus:** Encourage meaningful interactions over passive consumption, such as features for direct communication or collaborative activities.
- **Self-Reflection Tools:** Promote self-awareness and personal growth rather than comparison with others.
- **Time Awareness:** Include features helping users be mindful of their time on the platform and encouraging breaks.
- **Network Size Limitations:** Enforce a cap on the number of connections to around 150 people, fostering more meaningful and manageable social networks in line with our evolutionary capabilities.

2.2 Social Status and Reproductive Decisions

2.2.1 The Evolutionary Mismatch. Social media has all but altered people's attitudes toward social status, hence restructuring mating and reproductive choice[18]. Mating strategies evolved to maximize reproductive fitness, while digital metrics—such as likes and followers—deviate from the traditional strategy[6]. Our ancestors' position in the social hierarchy was given real-world resources and capacities directly relevant to reproductive success. Online positions often do not reflect these real-world values, and a mismatch between perceived social standing and real reproductive fitness could occur[18]. For instance, one may have tens of thousands of followers but not have enough resources or social skills to have a meaningful real-world relationship. The attention placed on online identities is at the expense of characteristics used for selecting mates, and this can have several adverse effects: Decreased birth rates, which in East-Asian countries are already at critical levels[18]. Online data point to decreased quality of offline interaction necessary for choosing mates[13]. Heightened stress tied to keeping up an online appearance that is damaging one's body and reproductive health[16]. Reproductive choices are postponed or forgone

because of striving for success according to online standards instead of conventional symbols of achievement[18].

2.2.2 Negative Consequences and Solutions. Ways this discrepancy might be offset with persuasive technology concepts:

- **Pointing to Real-Life Successes:** Celebrating and reinforcing real-life contributions and successes, such as volunteer work or professional accomplishments[4].
- **Relationship-Building Tools:** Functionalities which would strengthen long-term relationships, values, and goals, more than mere superficial online interaction[13].
- **Health and Wellness Integration Features:** Enhancing both physical and mental health—for example, fitness challenges or reminders of meditation to mitigate stress engendered by online personas[16].
- **Life Planning Features:** Tools used in setting and tracking long-term life goals, including relationships and family planning, refocusing attention on real-world aspirations[4].

2.2.3 Guidelines for Healthier Social Media Design. Consider these design principles for social media to promote healthier attitudes toward social status and reproductive decision-making:

- **Authenticity Incentive:** Reward and encourage users to present more authentic versions of themselves.
- **Diverse Success Metrics:** Implement a range of metrics for social success other than likes and followers, such as community impact or personal growth.
- **Real-world Connection Prioritization:** Design features that prioritize real-world connections and experiences.
- **Educational Content:** Include information related to relationships, reproductive health, and life planning.
- **Balanced Lifestyle Promotion:** Features that support a balance between online activity and off-line activities necessary for personal development and social relationships.

2.3 Linguistic Co-Referencing and Communication

2.3.1 The Evolutionary Mismatch. Social media messages are typically more informal and shorter; therefore, they are not bound by the same norms as face-to-face rich communications, and as such, they prove difficult to interpret and analyze. Human communication has evolved with non-verbal cues, immediate feedback, and a shared context[7]. All of these are missing in a text-based format of social media and hence cause misunderstandings[14]. For instance, a tweet or status may not be fully packed with all the context it should carry. The tone, facial expressions, or meaning from behind are thus misconstrued, leading to conflicts without immediate clarification by the recipient.

2.3.2 Negative Consequences and Solutions. This lexical mismatch can lead to several problems: co-reference—traditional forms of such—a reduced working effect, by which it becomes hard to tell when different words refer to the same entity; ambiguity in messages because social media status updates and posts are short and written in an informal style[12]; the potential for conflicts to escalate with the wrong tone or intent felt; and being able to hold coherent, context-rich conversations over time[7].

To overcome this, the power of persuasive technology can be harnessed:

- **Context Enhancement Features:** Features that urge users to provide more context with their submission; for instance, an "Ambiguity Context Creator" can be used for ambiguous posts.
- **Sentiment Analysis Integration:** Real-time analysis to prompt the user, in case the message is likely to be considered harmful, on what to do for clarification[14].
- **Interactive Clarification Features:** Features in recipients' hands to facilitate clarification request prompts from the senders and facilitate detailed and nuanced communication[7].
- **Visual Communication Aids:** More visual cues like emojis or GIFs that would help to communicate the mood and tone with written text.

2.3.3 Guidelines for Healthier Social Media Design. Consider these guidelines for healthier communication on social media:

- **Promote Clarity:** Support clear, context-rich communication through design and prompts.
- **Facilitate Threaded Conversations:** Design interfaces to facilitate orderly, coherent exchanges.
- **Facilitate Thoughtful Contributions:** Features that encourage users to think for a moment before responding to heated content.
- **Provide Language Tools:** Easy to use grammar, spell-checking, and style suggestions to enhance quality of communication.
- **Multimedia Communication:** Allow and encourage voice messages, video clips, or other rich media to supplement text.

2.4 Mating and Relationship Dynamics

2.4.1 The Evolutionary Mismatch. Social media and online dating have revolutionized human mating, thus altering the possible dynamics within a relationship. Yet these platforms throw their users in a "space" with numerous potential mates, in dissonance with the "space" presumed in more traditional mating strategies evolved by humans in small-scale societies with limited mate options[6]. For example, a person using a dating application is exposed to several hundred potential matches during one viewing, which impairs cognitive functioning so that selecting or committing to one is tricky[18]. This abundance of choice can also lead to a few problems:

- **Decision Fatigue:** Difficulty in making choices or commitments.
- **Reduced Satisfaction:** Many options often lead to decreased satisfaction with final selections.
- **Commitment Issues:** Awareness of many alternatives can inhibit long-term relationship commitment[6].
- **Increased Anxiety:** Constant availability of other options breeds anxiety about making the "best" choice[18].

2.4.2 Negative Consequences and Solutions. The next thing that comes up is that of:

- Decreased relationship stability and increased dissolution rates.
- Difficulty establishing deep, meaningful connections; this can be due to the perception that other alternatives are available[6].

- More stress and anxiety in the early stages of mate selection and keeping a partner; possible procrastination in long-term mating and family formation[18].

As a solution for this mismatch, we can use persuasive technology to ensure:

- **Quality Rather Than Quantity:** Algorithms providing quality matches based on compatibility rather than just numerous options.
- **Encouragement of Commitment:** Highlight committed relationships as being better through features that will make users go deeper[6].
- **Relationship-Building Tools:** Encourage emotional intimacy and shared experiences, such as shared goal-setting or virtual dates[18].
- **Reality Checks:** Remind regularly of what is terrible about too much choice and what is good about meaningful connection[5].

2.4.3 Guidelines for Healthier Social Media Design. The following recommendations for better mating ecology:

- **Limit Choice Overload:** Give a judicious number of matches to reduce decision fatigue.
- **Encourage Depth:** Features that push toward deeper interactions with fewer partners before moving on.
- **Establish Realistic Expectations:** Tell them about the downsides of too many options and how to invest in relationships.
- **Facilitate Relationship Maintenance:** Tools to maintain existing relationships rather than tools to create new relationships.
- **Facilitate Offline Interactions:** Encouragement of those who met online to meet offline to foster stronger bonds.

2.5 Eating Disorders and Social Comparisons

2.5.1 The Evolutionary Mismatch. Online idealized body image models always trigger a higher rate of eating disorders, such as aberrant eating habits and distorted body image. Image-based social networking, such as Instagram and TikTok, causes body dissatisfaction[15]. While the prototypical examples of suboptimal body image from evolutionarily studied environments were relatively confined in significance to one's local environment, exposure through social media fosters interactions with tens of thousands of idealized images that contrast sharply with evolved mechanisms for social comparison[2]. Possible effects include the following:

- **Chronic Stress and Neuroinflammation:** Social media comparisons can trigger stress that is chronic and related to eating disorders[15].
- **Increased Risk of Eating Disorders:** Frequent comparison of the body increases the risk of eating disorders and decreases body satisfaction[15].
- **Body Dissatisfaction:** Unrealistic standards lead to body dissatisfaction and disordered eating, mainly among adolescents and young adults[15].

2.5.2 Negative Consequences and Solutions. This often leads to a mismatch, with the following outcome:

- Heightened prevalence of eating disorders among social media users[15].

- Heightened body dissatisfaction and negative self-image, particularly in adolescents[15].
- Chronic stress and associated health problems, including neuroinflammation[15].

We can turn to persuasive technology to fill in this mismatch:

- **Reality-Check Features:** Pop-up reminders that show users the curated nature of social media content[2].
- **Positive Body Image Campaigns:** Show diverse body types and natural beauty content at the top of the feeds[15].
- **Supportive Community Tools:** Encourage users to join supportive communities focused on body positivity and healthy habits[15].
- **Educational Resource Integration:** Information and resources on the dangers of eating disorders and the significance of body positivity[15].

2.5.3 Guidelines for Healthier Social Media Design. The following are recommended to guide healthier social comparisons:

- **Encourage Authenticity:** Encourage users to share unfiltered, authentic pictures and their experiences.
- **Improved Representation:** Prioritizing diversity in body shapes, ethnicities, and lifestyles by algorithms.
- **Enabling Environments:** Create environments for discussing issues associated with body image and receiving positive reinforcement.
- **Educational Interventions:** Provide resources regarding positive body image and the risks of eating disorders.
- **Mindful Use Cues:** Includes reminders to take breaks and reflect on one's use of social media to mitigate the impacts of idealized images.

2.6 Emotional Manipulation through Multimodal Content

2.6.1 The Evolutionary Mismatch. Social media platforms use multimodal content, combining video, audio, and text. They can create semantic mismatches and emotionally manipulative ways which our ancestors were never able to do. Human emotional processing has evolved through face-to-face interactions with aligned cues. In contrast, social media misaligns these cues and exploits these psychological vulnerabilities[17]. For instance, text with a heartwarming picture, but it says just the opposite or a video with relaxing scenes and extremely stressful sound, thus causing cognitive dissonance and emotional confusion[2].

2.6.2 Negative Consequences and Solutions.

- Modification of perceptions and decision-making for the worse—heightened emotional upset[17].
- Maneuvering public opinion using emotionally sensitive material[2].
- Deterioration of trust in the media outlet[17].

To remedy this, we can employ persuasive technology:

- **Multimodal Coherence Checkers:** AI tools to measure the message consistency of content across modalities and alert users accordingly[17].
- **Emotional Impact Indicators:** Features that provide real-time information on the emotional impacts the content will have on them[2].

- **Media Literacy Training:** This interactive tutorial will be used in developing critical thinking in the analysis of multimodal content[2].
- **Emotion Regulation Prompts:** Different features that would encourage reflecting on emotional responses before engaging with or sharing content[17].

2.6.3 *Guidelines for Healthier Social Media Design.* The following are some guidelines for designing healthier social media:

- **Transparent Multimodal Messages:** Encourage multimodal content interaction and disclosure.
- **Coherent Multimodal Messages:** It is a must that the algorithms recommend coherent messages that include multiple content modes.
- **User-Controlled Multimodal Experiences:** Options to access content in single modalities.
- **Emotional Well-Being Checks:** A system prompts users to check their mood and take breaks.
- **Cross-Modal Verification Tools:** Features that allow users to verify information across modalities.

2.7   Social Media and Chronic Stress

2.7.1   *The Evolutionary Mismatch.* Social media introduces constant connectivity and social comparison, leading to chronic stress and impacting health[15]. Human stress response evolved for acute threats, but social media creates persistent, low-level stressors that our bodies are not equipped to handle[15]. For example, ancestors faced brief stress from predators, whereas social media users experience constant anxiety about online presence and FOMO, leading to chronic stress.

2.7.2   *Negative Consequences and Solutions.* This mismatch can lead to:

- Neuroinflammation and disordered eating behaviors[15].
- Increased risk of cardiovascular disease and weakened immune function[15].
- Higher prevalence of mental health disorders, including anxiety and depression[15].
- Disrupted sleep patterns due to constant notifications and pressure to stay connected[8].

To address this mismatch, we can leverage persuasive technology:

- **Stress Monitoring and Management Tools:** Features using biometric data to detect stress and provide personalized techniques[5].
- **Mindful Usage Prompts:** AI-driven notifications encouraging breaks or stress-reducing activities[5].
- **Social Comparison Mitigation:** Algorithms diversifying content to reduce exposure to stressful comparisons[12].
- **Digital Wellbeing Dashboard:** Tools tracking social media usage, stress levels, and digital wellbeing[5].

2.7.3   *Guidelines for Healthier Social Media Design.* Consider these guidelines for mitigating chronic stress:

- **Promote Periodic Digital Detox:** Encourage breaks through gamified challenges or rewards.

- **Implement Stress-Aware Interfaces:** User interfaces adapting to users' stress levels, reducing stimulating content.
- **Foster Supportive Communities:** Features facilitating supportive communities focused on stress reduction and mental health.
- **Educate Users:** Provide resources about the health impacts of chronic stress and digital wellbeing strategies.
- **Customize Notification Settings:** Granular control over notifications to manage exposure to stressors.

2.8   Ephemerality and Permanence

2.8.1   *The Evolutionary Mismatch.* Social media allows one access to both temporary and permanent content, which makes for an entirely novel setting for which our evolved social comparative mechanisms are contrasted with[10]. Where in ancestral environments, interactions were temporary, modern social media integrates temporary stories with permanent posts in a faulty manner. For example, Instagram stories vanish in 24 hours, but posts are eternal. This duality informs how social comparison and body image concerns worked in ways our ancestors never had to contend with[10].

2.8.2   *Negative Consequences and Solutions.* This mismatch could lead to:

- Increased social comparison and body image concerns with permanent content [10].
- Anxiety over the lasting impact of posts on self-esteem and social standing[12].
- Pressure to maintain a curated online presence across both ephemeral and permanent platforms[10].

This mismatch can be remedied by persuasive technology:

- **Ephemeral-Permanent Balance:** Features that encourage a healthy mix of ephemeral and permanent content, thus reducing curation pressure[5].
- **Content Lifecycle Management:** Tools that enable setting expiration dates for posts[5].
- **Reflection Prompts:** Features that incite or support reflection on long-term impact before posting[5].

2.8.3   *Guidelines for Healthier Social Media Design.* Consider these guidelines for mitigating the ephemerality-permanence dichotomy:

- **Flexible Content Lifespan:** Allow users to set visibility duration for their content.
- **Archive and Visit Again:** Features that remind the user about past contents and to revisit or recheck, and delete consequently overdue posts.
- **Context Aware Sharing:** Algorithms barfing out suggestions of appropriate content type based on the nature of the post.

2.9   Influencer Culture and Self-Esteem

2.9.1   *The Evolutionary Mismatch.* What this also presumes is an evolutionary mismatch that has emerged with the coming of social media influencers: How and to whom we make social comparisons[16]. The social comparison was limited, in ancestral environments, to members of small-scale communities, which was more possible

and usually about realistic targets. Modern social media, by bringing large parts of our lives online, continuously subjects its users to highly edited and typically unrealistic portrayals created by influencers. This exposure mismatch is stumbled upon in how the positive-biased images of influencers lead to upward social comparisons and thereby disaffect self-esteem[16]. As these evolved comparison mechanisms cannot process these idealized representations, it leads to feelings of inadequacy or lower self-worth.

2.9.2 Negative Consequences and Solutions. This mismatch can result in:

- Lower self-esteem due to frequent upward social comparisons[16].
- Distorted self-perception, especially among young users[16].
- Increased risk of mental health issues like anxiety and depression[16].

This mismatch can be addressed by the implementation of persuasive technology solutions:

- **Reality Check Features:** AI tools used to determine whether a notification has a heavily edited image[16].
- **Diverse Content Promotion:** Algorithms prioritizing diverse creators of content promoting realistic lifestyles[16].
- **Self-Reflection Prompts:** Features which prompt a user to reflect upon one's emotional states after consuming influencer-generated content[16].

2.9.3 Guidelines for Healthier Social Media Design. Consider these guidelines for mitigating the negative effects of influencer culture:

- **Transparency in Editing:** Encourage influencers to be transparent regarding heavy editing of photos.
- **Balanced Feed Algorithm:** These algorithms alternate influencer posts with close friends and family posts.
- **Positive Role Model Promotion:** Feature influencers promoting a healthy self-image and realistic lifestyle.

2.10 Social Media Intensity and Wellbeing

2.10.1 The Evolutionary Mismatch. The little time one uses to interact via social media could bring about an evolutionary mismatch with the original pattern of social interactions of human ancestors[11]. In contrast to the possibility of modern social media interaction, during ancestral ages, interactions were face-to-face and limited by the likelihood of proximity. That escalates to phone addiction driven by compulsive social media use among other individuals for whom it lessens subjective well-being[11]. Adverse effects on our mental health are linked to our evolved social mechanisms and an inability to respond well to constant digital social information[8].

2.10.2 Negative Consequences and Solutions. This mismatch causes:

- Reduced face-to-face communication and growing loneliness[11].
- Low life satisfaction due to constant social comparative and FOMO[7].
- Potential development of smartphone addiction and associated mental health issues[8].

To address this mismatch, the following persuasive technology solutions can be applied:

- **Usage Monitoring Tools:** monitors the features tracking and visualizing social media usage patterns[5].

- **Digital Wellbeing Prompts:** AI-driven notifications suggesting taking a break or switching activities[5].
- **Reward Systems for Balanced Use:** Gamified elements that would reward balanced use of social media and offline interleafing[5].

2.10.3 Guidelines for Healthier Social Media Design. Consider these guidelines for promoting healthier usage patterns:

- **Time Management Features:** Integrate customizable time limits and usage goals.
- **Mindful Engagement Design:** Design interfaces which elicit thoughtful rather than reactive engagement.
- **Offline Social Facilitation:** Features that facilitate for the user to meet and interact with other users in real life.

3 CONCLUSION

3.1 Summary of Findings

The thesis has explored the notion of evolutionary mismatches in social media and proposed guidelines for making healthier social media environments by integrating insights from evolutionary psychology with those from computer science. The main findings pointed out that social media platforms enhance evolutionary mismatches with possible adverse effects on mental health and well-being. Having looped in persuasive technology, therefore aligning social media design with our evolutionary psychology could make platforms promoting well-being and positive social interactions.

3.2 Future Research Directions

Future studies have to empirically validate the guidelines proposed here through further integration of evolutionary psychologists and computer scientists. Longitudinal studies will help assess the the long-term impacts of these guidelines on user well-being and social interactions.

It is thus essential to redesign social media aimed at improving human well-being in this digital health time. The paper explicates ways through which design aligned with our evolutionary psychology, coupled with persuasive technology tools, can be resorted to in creating much healthier social media that ensures positive well-being for all users.

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A HEADINGS IN APPENDICES

A.1 Appendix A.1

During the preparation of this work the author used

- **Perplexity AI:** As the main source of information for searching tens of papers on evolutionary psychology and on persuasive technology
- **Perplexity AI:** To write the citation text for the needed papers in the Bibtex format.
- **Gramarly:** To find gramatical mistakes in the final document
- **ChatGPT:** To find places in the thesis where contradictions and logical fallacies were present

After using these tools/services, the author reviewed and edited the content as needed and take(s) full responsibility for the content of the work

A.2 Appendix A.2 acknowledgements

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