**2.1 The Evolutionary Basis and Societal Increase of Loneliness**

Extensive research consistently affirms loneliness is an integral element of human life (Cohen 2022; Heinrich and Gullone 2006; Cacioppo et al. 2013). It stems from our evolutionary imperative for social connection and belonging, shaping the survival and progress of the human kind (Allen and Furlong 2021), which include a sense of relatedness to others (Prescott 2023). The transition from communal living to personal autonomy has been linked to increased loneliness in the past two decades (Evans et al. 2022). The rapid growth of urban regions and the breakdown of traditional family structures contribute to the decline of mental health and the amplification of feelings of isolation (Anders Carlson-Wee 2023). Studies shows the role of environmental and societal changes brought about by fast-paced economic development and high technology usage has been linked to elevated levels of stress and health problems, which in turn can contribute to a sense of isolation (Prakash et al. 2023; Afifi et al. 2018).

Research demonstrates noticeable uptick in loneliness levels in recent years, despite the integration of standardized assessments of loneliness into ongoing panel studies in the past 15 years (Luhmann et al. 2023). It is substantially more acute in developed nations leading with the United States (Infurna et al., 2024). Nonetheless Current **U.K.** government surveys reveal that nearly half the population reports feelings of loneliness ([Gov.UK](http://gov.uk/) 2021).It has also been consistently demonstrated that the prevalence of this phenomenon is higher among the **younger adults** and **older adults** (Wrótniak, 2020; Matthews et al., 2018). A recent cross-temporal meta-analysis by S Buecker et al. (2021) underscores this trend and concludes that it is primarily influenced by societal and technological changes.

**2.2 Ramifications of prolonged loneliness**

Loneliness emerges from a misalignment between the desired social relationships of an an individual and their current social circumstances (Registrar 2016). ). Chronic loneliness ranks among the most serious threats to overall well-being (Cacioppo and Patrick 2008). It is strongly linked with mental health disorders such as depression, anxiety, and heightened stress levels (Hoffart et al., 2020). Additionally, it significantly impacts social skills, leading to social withdrawal and a decline in social networks, thereby intensifying feelings of isolation (Gardner et al., 2005). Numerous studies have shown that loneliness can be as detrimental to health as smoking or obesity (Holt-Lunstad 2018; Beutel et al. 2017).

There are also societal repercussions, including a significant economic burden associated with loneliness. This burden manifests in increased healthcare utilization and reduced productivity due to mental health issues (Meisters \*et al.\* 2021). Various industries are also weaponizing this phenomenon that both directly and indirectly changing consumption preferences and modes (Wang and Liu n.d.) further fuelling increasing materialism (Pieters 2013) and isolation.

**2.3 Technological Interventions for Loneliness:**

*aim existing stuff with studies and shortcomings*

Research indicates a pronounced emphasis on studies and interventions directed at older individuals compared to younger cohorts (Dickens et al. 2011). Although loneliness affects both age groups, the nature of interventions provided varies, older adults are more frequently offered technology-based solutions tailored to their specific needs. On the other hand, younger individuals tend to utilize platforms that are not specifically designed to combat loneliness (Shah and Househ 2023). Social media frequently regarded as an excellent platform for establishing connections (Berezan et al. 2019) and lonely people are more inclined to turn to these as a substitute for participating in offline social activities (Nowland et al. 2018). Although research presents varied outcomes, correct engagement with these platforms can negatively correlate with feelings of loneliness (Guo 2015). The digital landscape offers a multitude of features aimed at emulating interpersonal communication and promoting interconnectedness.

**Transitioning from the broad use of social media to specific interactive features,** chatting capabilities that allow for instantaneous communication, resembling face-to-face interactions and bridging both geographical and interpersonal divides (Ong et al. 2011). Related research explores how virtual group identities on platforms like Discord can help reduce feelings of loneliness by providing a sense of belonging and social interaction (Rai et al. 2022).

**Further enhancing the experience, p**latforms that enable users to express themselves more fully through sharing thoughts, experiences, and images can cultivate a feeling of inclusion. The feedback and responses received in response to these expressions can authenticate personal encounters and emotions (Deters & Mehl, 2012). A recent case study by MB Kelly, B Phillips, and CR Davies delves into the ways in which social media platforms such as Facebook and Instagram can enhance community involvement by encouraging shared interests like photography. The study emphasizes that social media art challenges not only encourage artistic engagement, but also contribute to mental wellness by alleviating feelings of isolation through communal participation (Kelly et al. 2023)

Moreover, most of these platforms dedicated to fostering communities where individuals can engage with others who share similar interests, hobbies, or personal connections, thereby promoting connections among individuals with common interests (Smith and Alheneidi 2023). An illustrative study by Guidi et al. (2020) explores the dynamics of Facebook groups and their role in forming and sustaining communities. By analyzing how communities evolve within these groups, it reveals how individuals connect with others who share similar interests and beliefs.

**Building on this theme of specialized online communities, there are also specialized applications developed specifically to address loneliness.** Among these, dating and matching apps have grown in popularity. When used effectively, these applications not only create social opportunities but can also mitigate loneliness and ease emotional exhaustion (Sarwar Shah et al. 2019). Recent study by Nikki Dean Marshall et al. (2023) examines the impact of online dating platforms, such as Bumble BFF, in alleviating social isolation amidst the pandemic. It emphasizes the shift of users towards these platforms not only for romantic relationships but also for companionship and social engagement.

Another example of such technology includes therapeutic chatbots. They crafted to mimic companionship, are increasingly deployed especially among elderly populations to alleviate loneliness and enhance mental well-being (Rebola and Malle 2021). Despite their growing numbers, they often face limitations due to cost and the lack of personal touch in interactions. As a result, they may not fully replicate the empathy and connection found in human interactions. Recent research involving a randomized controlled trial examined the effectiveness of a therapeutic chatbot named Fido, which utilizes cognitive behavioral therapy techniques. The findings indicate that Fido was successful in reducing symptoms of anxiety and depression (Stanisław Karkosz et al. 2024).

**Short comings :**

Despite the deep integration of various digital tools and platforms into our daily lives, social media can turn from a mitigating factor of loneliness to its very cause (Hasyim and Cuzzamu 2022). Being able to share things publicly can have positive effects, the feedback the user receive do not necessarily equate to meaningful social engagement. While recent study shows that receiving a positive feedback after posting status updates such as likes on social networking sites predicts lower level of loneliness (Sun et al. 2022), comments on posts often serve as a catalyst for arguments (Gkotsis et al. 2016).

In several ways, including a reduction in face-to-face interactions which in turn can diminish the quality of relationships, the overuse of social media can negatively affect users (Gupta et al. 2022; Mahmud et al. 2017). Rarely do most social media platforms include features that inherently benefit, support, or encourage in-person gatherings unless it is a primary function, further exacerbating the issue (Martland 2017). Most of these sites aim to be the place where people meet rather than helping them do it in real life. By presenting users with content that reflects their previous online activities, social media platforms establish echo chambers, leading to polarization and undermining social unity and dialogue (Calderón et al. 2019).

On pairing applications the matching often emphasizes superficial criteria such as attractiveness or cursory interests, which can lead to transient interactions. This focus on surface-level attributes can impede the development of deep, lasting relationships (Zhang et al. 2017).

Designed to maximize user engagement and profit, these platforms encourage prolonged use, thus prioritizing immediate revenue over long-term relationship satisfaction (Van Alstyne and Parker 2017).

While this approach may be beneficial from a business standpoint, it tends to perpetuate a cycle where individuals continuously seek new connections at the expense of deepening existing ones, potentially increasing feelings of loneliness (L’Ecuyer et al., 2017; Thomas et al. 2023).

**Solution:**

* User retention: It can be effectively managed by adopting the principle coined by Ludwig Mies van der Rohe: "less is more." Instead of creating an artificial environment that encourages constant searching for matches in the pairing section of the application and incorporating shallow attributes such as behaviours, past interactions with the application, or popularity levels (Light et al., 2018). The matching algorithm of BondBrew **is based on** the common interests that users explicitly provide and their geographical proximity. These factors are then calculated to establish a compatibility score. This methodology is **is similar to the one used to** adjust the Twitter algorithm, which, by simplifying and reducing its complexity, substantially enhanced straight pairing between users, as evidenced by Courtois and Timmermans in a recent study (2018). **Furthermore, s**ince user engagement rate is important in a social media life cycle, user retention could be balanced by shifting reliability from overly complex algorithm in pairing, to other features such as chat which have been shown to effectively maintain user interest and activity (Kayes and Chakareski, 2015).
* Facilitating face to face gathering: Given the fact that the majority of social media platforms do not facilitate social interactions unless they are specifically designed for that purpose (Hasyim and Cuzzamu 2022) or possess significant influence over such gatherings (Haque et al. 2021), it is evident that a viable solution is required. **To address this, t**here are platforms where users can connect with one another or join groups, but these tend to cater to specific niches (Sorathia and Joshi, 2009). Although useful, this specialization often restricts users the flexibility to create personalized plans where they can control their own social narratives (Nagatsu and Salmela 2023). Studies show that users in Facebook groups can create personalized plans. Evans and Cowley (2010) found that social media platforms can support individualized engagement within group settings. This allows users to customize their social connections based on their specific needs and desires, even within a group. **By introducing this feature,** BondBrew aims to take it further by offering a platform that empowers users to generate personalized plans. These plans are visible to all users, enabling anyone to view them and express interest. By eliminating the limitations often associated with niche-focused social media platforms, this unique feature promotes a more extensive and inclusive interactions. As a result, this open accessibility allows users to easily connect with like-minded individuals and build relationships.
* Therapeutic chatbot: Study points out how chatbots can improve mental health for several factors, including accessibility, providing 24/7 immediate support while maintaining full anonymity and avoiding human biases (Abd-Alrazaq et al. 2020). However, challenges remain with large language models such as occasional hallucination and lack of human touch (Jha et al. 2023). Despite these hurdles, another study highlights the economic aspect that these chatbots usually incur a cost for the user, while in the United Kingdom mental health support is free. However, from a business perspective chatbots are more cost-effective than mental health practitioners on a larger scale (Pham et al. 2022). This suggest that the growing number of health care chatbots are projected to rise even higher, as highlighted by Moore and Caudill (2019). Chatbot of BondBrew, Sentimate, is offered free of charge and is underpinned by extensive therapeutic data.
* Additional developments: BondBrew is uniquely designed to incorporate or omit features based on research findings. For instance, the application excludes the comment feature on posts, responding to studies that indicate such interactions can have negative effects. Conversely, it offers visual customization options for its interface, a feature not commonly found in other social media platforms, as highlighted by Swati et al. (2021). Another distinctive feature feature that sets it apart from conventional social media practices, it allows users to see who has liked their profile without the need to pay for this information (Obie et al. 2023).
* This holistic approach is reflected in the incorporation of different technological interventions with new strategies that put BondBrew to the front line against loneliness. This development, focusing on the building of deeper relationships between people and encouraging face-to-face interaction, underlines its willingness to fight the hidden problems caused by the digital platforms and their impacts on human well-being.