**Empirical Results**

The output of the Hausman test confirms that the Fixed Effects model is the most appropriate (χ2 = 40.460, p < .001) in this situation, and a Time Effect variable was also added after conducting a preliminary F-test (F = 10.794, p < .0001). Table 4 shows that there was no immediate significant relationship between loneliness and happiness within the estimated sample, with or without the time effect estimator. The lack of a direct relationship might explain why it is so difficult to detect the role of loneliness within an individual’s happiness determinants, as such subsequent models use behavioral characteristics to try and uncover a possible connection.

The models in table 5 progressively include regressors for online communication, civic identification, and various methods of political and social engagement. In specific, the results are distinguished between online and offline methods of engagement, however the uncontrolled relationships shown within the two models remained the same. Employing online communication had a significant role in self-reporting as moderately happy rather than very happy both when considering more prevalent online social engagement (t = -1.657, p < .05) or a preference for offline engagement (t = -1.515, p < .05). The engagement itself had no role in the change in self-evaluation, but the most surprising results were found within the social cohesion variable.

In fact, lower levels of reported social cohesion had significant roles in determining if a respondent considered themselves more happy or less happy as opposed to somewhat happy. In specific, individuals with low levels of social cohesion were more likely to report themselves as unhappy, as opposed to moderately happy, regardless of engagement method (t = - 2.70, p < .01; t = - 2.904, p < .01). On the other hand, individuals with high levels of cohesion were more likely to feel moderately happy rather than very happy, also disregarding engagement methods (t = -2.586, p < .01; t = -2.371, p < .01). This shows that perhaps cohesion acts as an equalizer, risking a degree of discomfort for people who might not need to socialize, but also improving the mood of those that might need to feel connected to others. It is reasonable to assume that people who feel more disconnected are also those who suffer more from a general lack of social trust.

To this point, the subsequent models tried to remove individual bias by also accounting for behavioral preferences, current interaction levels (especially with family), and familiarity with online tools. Table 5 then puts the two pairs of models side to side, and reveals that accounting for these characteristics might open a way to uncovering the relationship between loneliness and happiness. In fact, in the controlled model, individuals with high levels of loneliness were more likely to feel unhappy if they primarily utilized offline methods of engagement (t = 1.599, p < .10). While the change in significance was small, the same change was not reported in individuals who instead prefer online methods of engagement. Instead, the relationship of unhappy people with online tools reversed, with the output indicating that if we account instead for the use of online engagement tools among unhappy respondents, these tend to decrease the probability that individuals may self-identify as unhappy rather than moderately happy (t = - 1.834, p < .05).

The other identified relationships remain the same, or are strengthened by the control environment, as evidenced by the increase in significance of the online communication variable. Table 6 shows the relative risk ratios of the relevant independent variables, and confirms the hypothesized relationships between loneliness, online communication, and social cohesion. High levels of online communication lead to drastic increases in the probability of feeling more unhappy, with the risk increasing as we engage with more digital methods of social connection (RRRoffline = 0.122 to RRRonline = .146). Furthermore, low levels of civic identification only exacerbate the probability of feeling very unhappy as opposed to moderately happy (RRRoffline = 37.267 to RRRonline = 43.835), with the risk once again increasing as we consider online as opposed to offline methods of engagement. Finally, the slightly significant decrease in the probability of feeling very happy as opposed to moderately happy among high cohesion individuals is worth mentioning, since it may warrant and independent exploration of this unexpected phenomenon.

**Accounting for Political Bias**

The post-election happiness survey made by the American National Election Study was then used to see if the election, and the subsequent changes in restriction measures, had changed any of the previously found relationships. The correlations shown on table 7 indicate that there is a high degree of similarity between both happiness variables, although the GSS variable reports levels of happiness pre-November 2020, while the ANES one reports levels from the period between November 2020 and January 2021 (ANES, 2022). To reaffirm the connection between wellness and loneliness, the table also includes measures of the latter and of health, confirming the assumption that there is a significant relationship between physical and mental wellness and feelings of disconnection (P < .0001).

The models were rerun while substituting the happiness variable with its post-election variance. At the base level (Table 8), the fixed effects models accounting for just time and loneliness remained insignificant, but the biggest changes were seen when running the full models and their controls. Online communication became insignificant in both online and offline contexts of engagement, while levels of cohesion lost significance or reversed their relationships. In fact, individuals with high levels of cohesion now were more likely to feel unhappy than moderately happy at a high level of significance when considering online social engagement (t = 2.540, p < .05) and at a small level of significance when considering offline social engagement (t = 2.161, p < .05). Engaging in social activities within offline contexts was actually detrimental to the happiness of most respondents, with the latter being more likely to report losing happiness if participating in real social activities.

The controls saw a higher change in positive significance, with religiosity (t = - .881, p < .05; t = 1.173 and volunteering (t = 5.467, p < .05; t = 4.244, p < .10) being the main beneficial drivers of happiness in both online and offline contexts of engagement. Concurrent to this change, technology focused occupations were more likely to make people feel relatively happy as opposed to very happy in both models of engagement (t = - 13.88, p < .05; t = - 1.618, p < .05). These associations can be further inspected in table 10, where we can see that offline engagement (RRRoffline = .010) and high civic identification (RRRonline = 12.675) both significantly increase the probability of feeling unhappy versus moderately happy.

**Limitations**

Given these results, it should be noted that the study suffered from a high level of missing cases deriving from the incompleteness of the original dataset. Furthermore, the small timeframe of study meant that, even for the complete cases, only a limited amount of information could be pulled from the period before, and after, the initial lockdown. An additional series of years could have been beneficial to the robustness of these results, however the General Social Survey does not typically experience consistent response rates.

Furthermore, slight differences in yearly panel questionnaires meant that some of the variables had to be manipulated to be usable in a fixed effects context. Two notable examples are the cohesion and the social participation variables (*cohesion, partpartonline, partpartoffline*) which were created by combining several responses from the 2018 GSS panel year and the ANES 2020 questionnaire. While precautions were taken to assure that no discrepancies would be found between the variables across the two panel years, the solution was not as ideal as having a complete set of identical questionnaires.

Finally, the nature of the Fixed Effects model meant that several observations were lost due to lack of variance across panel years. It is possible that by employing a different model, results might have been different and more robust[[1]](#footnote-1), however the use of the current model was confirmed by several preliminary tests, such as the Hausman test and the time effects test.

**Discussion**

With increasing levels of loneliness (Weissbourd et al., 2021) facing concurrent increases in online connectivity (McClain et al., 2021), this study tried to understand why positive changes in social connection accessibility are not directly associated with higher levels of societal cohesion and individual happiness. To do so, it used behavioral indicators of social engagement to detect the role that loneliness plays in individual wellbeing and cohesion levels. The results found a faint, but not sufficiently significant, relationship between one’s own loneliness levels and happiness, controlling for self-identification with the community, methods of communication (online and offline), and degree of use of online resources. While promising as a starting point, unfortunately these results are not enough to justify the use of behavioral mediators such as political participation to detect the effect of loneliness on happiness.

On the other hand, it can be said that social identity and sense of community belonging are better predictors of happiness than loneliness itself. In fact, the significance of overall social identification on the probability of being very happy or very unhappy as opposed to not experiencing any change in wellness can be traced back to inherent evaluations of one’s own social network (Dijulio et al., 2018). Verily, individuals are not as affected by the frequency of their social ventures, but rather by the quality of the relationships they establish. This is why, when accounting for individual differences and other social activities, the negative relationship between happiness and cohesion decreased within offline engagement contexts, yet increased when considering online engagement. As individuals rely more and more on digital tools of connection, the overall quality of their relationship network decreases and thus they feel more unhappy (van Eldik et al., 2019).

What mostly justifies this statement is the powerful presence of high levels of online communication among individuals who experienced decreases in happiness levels between 2018 and 2020. In fact, before the presidential election, when the pandemic was causing early experiences of lockdown and, by late 2020, prolonged bouts of social isolation, most people suffered the physical restrictions caused by social distancing measures. By the time the new year arrived, the initial social fragmentation seemed to disappear (Abrams et al., 2021), along with the negative effect of online communication on personal wellness. However, this should be read as a change in societal priorities rather than a resignment to online engagement: in fact, the relationship between online communication frequency and happiness did not become positive, rather other measures of social participation gained higher importance and significance among the respondents.

In essence, people actively engaged in social activities without necessarily being more happy for it (table 9; t = - 4.627, p < .01). Rather, it was the nature of the activity itself, be it volunteering or religious activity, that increased their levels of happiness, and even some degree of online political engagement proved to be partially beneficial to the self-reported wellness of the study respondents. As such, while the role of social engagement as a mediator between loneliness and happiness can’t be confirmed yet, the direct relationship between social participation and identification and personal feeling of wellness was found to be robust across the physical disconnection caused by the pandemic and the political turmoil of the 2020 election.

**Conclusion and Future Directions**

Since loneliness has severe implications on physical (Holt-Lunstad, 2015; 2022) and mental health (High et al., 2022) it especially important for a functioning democratic society to address those who are left at the margins of contemporary digital communities. Although well-intentioned, online communication and social online platforms do not offer the same benefits to wellness as physical interactions (González‐Bailón & Lelkes, 2023), and instead may be even detrimental to the strength of a community’s network of interpersonal relationships. While not finding social cohesion and social engagement to be significant mediators of loneliness and wellness, the findings confirm that low social identification primarily affects wellness when engagement occurs offline. Furthermore, prevalence of use of online communication tools may stunt a person’s happiness growth. Nevertheless, it would be interesting to understand in what specific contexts online communication increases happiness when measured through social and political action (Marlowe et al., 2017), and some studies have already put both social capital and social cohesion as important economic (Klein, 2013) and community development tools (Bekalu et al., 2021). Future studies should then look at the role of social cohesion and participation in the mental and physical effectiveness of small local communities, understanding how effective both are at predicting the individual feeling of connectedness of each member and their perceptions of physical and emotional loneliness.

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1. See Appendix for Random Effects model, and tables showing differences in significance. [↑](#footnote-ref-1)