

How Friendship Influences Health

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Abstract

Friendship is the single best predictor of both psychological and physical health and wellbeing. The evidence suggests that five close friends and/or family is optimal, but it is important to remember that these five are also part of a wider network of friendships and extended family that are also important to our wider social life. I review our current understanding of personal social networks and the mechanisms used to bond these. Friendships are underpinned by a dual process mechanism that involves the brain's endorphin system activated by activities we do with our friends and a set of cultural and psychological traits that attract us to certain individuals. The endorphin system activated by friendships have direct effects both as anti-depressants and through their capacity to influence the body's immune system.

Key Words: Health, wellbeing, social networks, bonding, friendship

Introduction

The modern world is disconcerting, full of uncertainties, anxieties and stresses. Not only does this influence our psychological sense of wellbeing (thereby giving rise to depression), but it also has direct negative effects on our immune system, making us more susceptible to all kinds of physical illnesses that the body would otherwise be able to cope with very easily. The last few decades have witnessed a dramatic rise in psychological ill-health, especially among young adults (as has been documented by Haidt 2024). This has found expression in rising levels of anxiety and depression, as well as suicide.

In this article, I will argue that the best natural antidote to both physical and psychological illness is friendship. I will begin by briefly reviewing some of the evidence for the benefits of friendship and then explain in more detail why friendship has these effects.

Why friends are good for you

Let me give two examples of the effect that friends have on your health. The first is a meta-analysis of 138 studies of heart-attack patients (Fig. 1a). Its total sample size was ~310,000 people. As an index of success, it used whether or not you survived for 12 months after your first heart attack. It asked: what factors best predict your survival? As is evident from the figure, the two best predictors are your social network and giving up smoking. Social network here is a composite measure of both the number and quality of close friendships. To be sure, there is some advantage to be gained from drinking less alcohol, taking more exercise, losing weight, and taking the pills that your doctor advises, as well as other indices not shown here (including eating less “fast food” and living in an area with less air pollution), but just having friends and giving up smoking will give you a better chance of life than anything else.

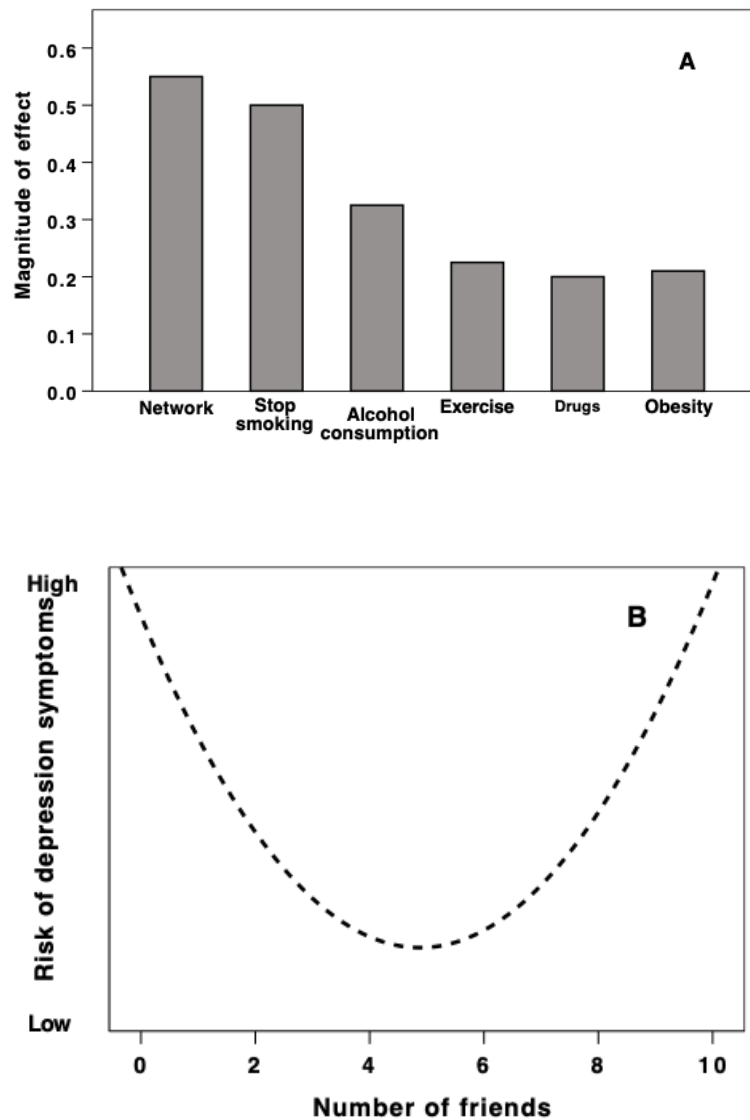


Fig. 1. How friends benefit our health. (a) Relative influence of different factors on the probability of surviving for 12 months after a first heart attack, based on a meta-analysis of 138 epidemiological studies mainly in the USA. The number and quality of close friendships and giving up smoking are most likely to influence your chances of surviving 12 months after a heart attack. Redrawn from Holt-Lunstad et al. (2010). (2) Likelihood of reporting symptoms of depression in two years' time as a function of the number of close friends now, based on a prospective survey in 13 European countries. People who have five close friends are least likely to experience depression in the future. Redrawn from Santini et al. (2021).

The second study focussed on depression and psychological wellbeing. Fig. 1b plots the probability of exhibiting symptoms of depression in two years' time as a function of the number of close friends that you have now, based on a large prospective study of some 30,000 retired

people in 13 European countries (Santini et al. 2021). The optimal number of friends that minimises the risk of depression is just five. Notice that the risk of depression is a U-shaped function of the number of friends. Having fewer than five friends *or* more than five friends both impact negatively on your likelihood of developing depression. It seems that if you have too few friends you don't get enough of the positivity that friendship provides. But if you have too many friends, then this does not help, probably because you spread your social capital too thinly among your friends, such that your friendships are on average less warm than if you only had only five. In other words, just as the Fig. 1a study showed, it is both the number *and* the quality of your friendships that are important.

In fact, there is now a significant number of studies that examine what best predicts psychological health and wellbeing, physical health and wellbeing, and even how long you can expect to live into the future, all of which agree that the optimal number of friends is five. For recent summaries, see Dunbar (2018) and Pezirkianidis et al. (2023). It is not entirely clear what causes this effect, but most likely it has something to do with what you do with friends. The U-shaped relationship in Fig. 1b suggests that it probably has something to do with how thickly or thinly you spread your time and emotional capital among your friends so as to create strong friendships.

How we create friendships

More than anything else, friendship involves time. It takes time to build up a friendship, and it takes time to maintain that friendship at the same level once it has been established. Many studies show that friendships decay over time if we do not continue to invest in them (Burt 2000; Roberts & Dunbar 2015). It can take as little as three months for a noticeable cooling

to occur in the emotional quality of a friendship if two friends are prevented from meeting for some reason (Roberts & Dunbar 2015).

We have identified two major components in the mechanisms that underpin friendship. One involves the brain's endorphin system and the role this plays as the pharmacological 'glue' that helps to bind friendships. The other is the phenomenon known as *homophily*, meaning 'love of the same'. This second mechanism operates at a more cognitive level in that it is about our perceptions and ideals as to who would make a good friend. These two processes operate together in tandem in what psychologists would call a *dual process mechanism*: two separate neural mechanisms that reinforce each other but exploit different neural networks in the brain. Let me explain each of these in more detail.

Endorphins are neuropeptides that form part of the brain's pain management system: they dampen down feelings of pain and make us feel warm, at peace and bonded with those around us. We exploit this system by a variety of behaviours that trigger the endorphin system through a number of mostly pleasurable social activities: physical touch, laughter, singing, dancing, feasting (eating together), storytelling and the rituals of religion. Fig. 2 summarises a large number of experiments that tested these activities both for endorphin release and for an enhanced sense of bonding with the people when subjects engage in the different activities. Most of these are obvious as activities, but 'drums' refers to active music-making (in this case, in a drumming group), 'music' refers to performing music (with a control that involved just listening to randomly chosen music), 'religion' refers to a series of studies carried out during religious services (mainly Christian of various denominations, but also an Afro-Caribbean syncretic religion in Brazil, as well as yoga), and 'film' refers to watching an emotionally wrenching film. The unfilled (white) bars in each case refer to

control groups that performed a similar activity (e.g. listening to music rather than performing music, or watching a documentary film) that did not involve the same level of arousal as the experimental condition. The grey bars indicate studies where endorphin activation was assayed indirectly using changes in pain tolerance (pain threshold): since endorphin suppress feelings of pain, their activation should result in a higher pain threshold after any activity in which they are activated. The black bars indicate studies in which endorphin activation was confirmed both by the pain threshold assay and by brain neuroimaging or by administration of endorphin antagonists (mainly naltrexone that locks onto the endorphin receptors in the brain but are pharmacologically neutral – i.e. produce no discernible effect of any kind).

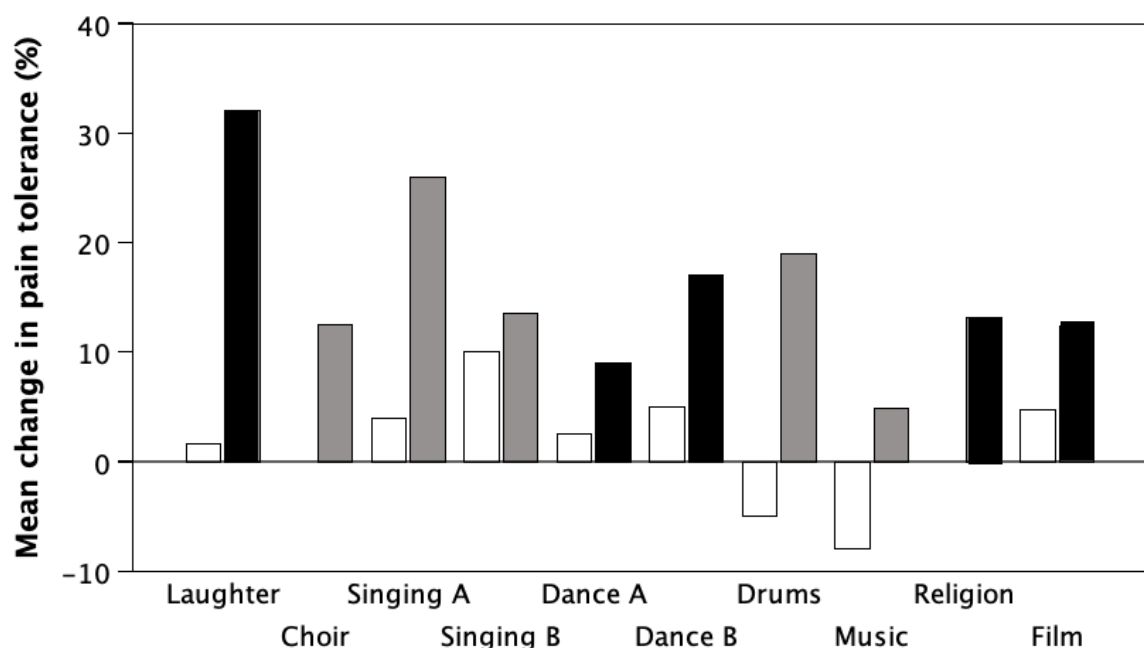


Fig. 2. Change in endorphin activation (indexed by an increase in pain threshold from before to after performing a task) as a result of engaging in a variety of social activities. A and B indicate different samples with the same activity. Filled bars indicate experimental conditions involving the indicated activity (Black: tests supported by PET neuroimaging or chemical intervention with an endorphin antagonist such as naltrexone; grey bars: experiments in which endorphin activation was tested only with a behavioural assay such as the change in

pain tolerance); unfilled bars: control conditions (a matched neutral activity such as listening to music rather than singing, or moving arms in time to music rather than full body dancing). Note that the experimental activity yielded much greater increases in pain tolerance than the equivalent control condition, and that in some control conditions pain tolerance was actually *lower* after the activity than it was before. Reproduced from Dunbar (2025).

It is obvious from the figure that all these interventions cause the endorphin system to be activated, creating the kinds of pleasant sensations associated with opioids: the change in pain threshold is more positive in the experimental condition than in the matched control condition. Each of these has, at the same time, also been shown to increase the sense of bonding to other individuals and/or increase the sense of bonding to the wider community within which we are embedded.

Fig. 3 shows, for a national UK sample, that the number of close friends we have (our support clique or, as we sometimes describe them, our shoulders-to-cry-on-friends) increases with the frequency with which we eat together with other people. In effect, the more we engage with others socially, the more likely we are to build up close friendships. Fig. 4 puts this in a wider community context: it plots the mean rating for a number of indices of community engagement for respondents in the same UK sample. People who often eat socially are more engaged with their local community, trust their neighbours more, feel their lives are more worthwhile, are happier and are more satisfied with their lives than people who typically eat alone.

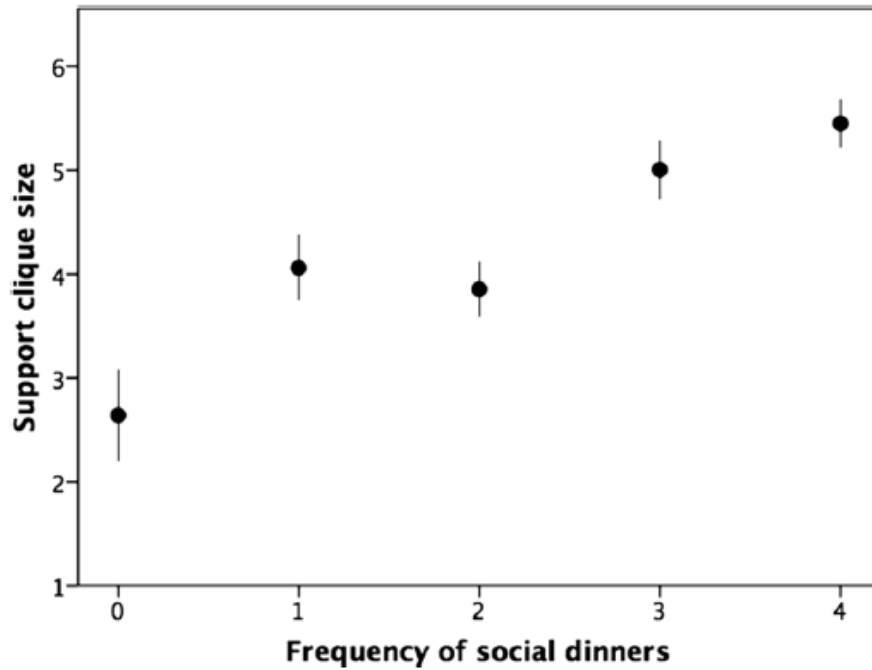


Fig. 3. Mean ($\pm 95\%$ CIs) number of close friends we have is correlated with the frequency with which we typically eat our evening meal with other people (indexed as the number of social dinners per week). Based on a national UK random stratified sample of 2000 respondents (i.e. respondents are sampled proportionally to the distribution of gender, age and region in the UK). Reproduced from Dunbar (2017).

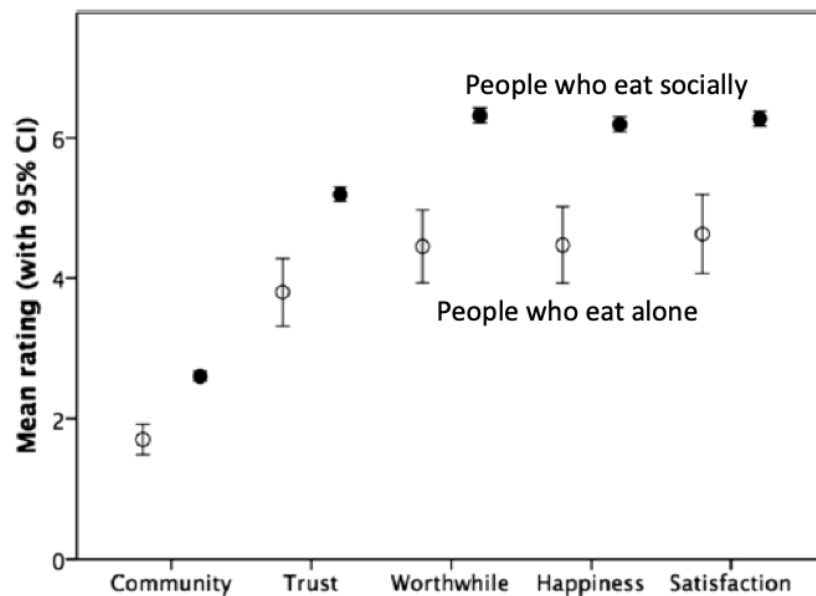


Fig. 4. Mean ($\pm 95\%$ CIs) ratings for being engaged with the local community, trusting the local community, feeling that life is worthwhile, feeling happy and satisfied with life for

respondents who typically eat their evening meal with other people (social eaters) compared to those who more typically eat alone. Based on a national UK randomised structured sample of 2000 respondents. Reproduced from Dunbar (2017).

Not only do endorphins provide the ‘glue’ that holds our friendships together, but they also have more direct benefits that influence our health and wellbeing. Because endorphins are opioids, they lift our mood and give us more resilience to both physical *and* psychological pain. In fact, weight for weight, endorphins are 30 times more powerful as analgesics than morphine (see Dunbar 2025). These psychotropic properties make endorphins the best treatment for depression – *and* they are free. We just have to engage in those activities that trigger them in the brain (Fig. 2). In addition, it turns out that endorphins activate the body’s immune system, in particular the natural killer (or NK) cells in the white blood cell system. These target, in particular, viruses and some cancers, thereby providing a direct biochemical link between friendship and its effects on our physical health.

The second dimension of friendship formation is the phenomenon known as *homophily*: the people we prefer as friends tend to be those who are most similar to us. Homophily comes in two forms – endogenous homophily and exogenous homophily (Dunbar 2018). Endogenous homophily refers to those aspects of our psychology and biology that we cannot do anything about because they are part of our make-up as individuals. There are four main dimensions to this: gender, age, ethnicity and personality. For example, 75% of women’s extended social networks consist of women, and 75% of men’s networks consist of men, and this value remains remarkably stable from the age of 5 to 85. Similarly, most of our friends are of similar age to us. We also prefer people who come from our own village, tribe or country if we have the chance to choose. Finally, extraverts prefer extraverts as friends, and introverts prefer introverts. We think this has less to do with inherent biases than with cultural

differences: the more similar others are to us, the more we share in common with them in terms of how we see the world, how we expect other people to behave, what we find interesting to talk about, even the jokes we like. It is just easier to engage in conversations with people who share a lot in common with us.

This is borne out by the exogenous forms of homophily. These consist of seven dimensions, all of which are cultural. They are: sharing the same language (or, better still, dialect), growing up in the same location, having the same career trajectory and life experiences, having the same hobbies and interests, the same worldview (a composite of our religious, moral and political views), the same musical tastes and the same sense of humour. I have referred to these seven dimensions as the ‘Seven Pillars of Friendship’ (Dunbar 2018, 2021).

These are largely things we learn or experience in late childhood and our teenage years. Of course, some of them are also things that can change over the lifetime as we are exposed to new communities – though this is not true, of course, for our dialect or where we grew up. No matter how well we learn a second language as an adult, we never quite speak it like someone who spoke it from birth. In fact, dialects are remarkably small scale. For native English speakers born and raised in Britain, you can identify where they were born to within 20 miles the moment they start to speak. In fact, for most of us, the community in which we grew up remains rather special throughout our lives; if, later in life, we meet someone from our home village, there is nearly always an immediate bond even if we have never met them before. The merit of the Seven Pillars is that it provides a simple metric of how likely it is that we grew up in the same community. As a result, the more traits we share with someone, the more likely we think they will make a good friend and the more willing we are to be altruistic towards them (Curry & Dunbar 2013; Launay & Dunbar 2015).

Structure of friendship circles

I mentioned at the outset that what seemed to matter most for our health and wellbeing is the innermost circle of five best friends, our shoulders-to-cry-on friends. While this is certainly broadly true, we need to remember that these are not the only friends we have. Nonetheless, the number of friends we have is not unlimited: there are very strict limits on the number of people we can maintain meaningful friendships with at any one time. This reflects the time and energy we have available to invest in creating and maintaining friendships. The time costs of maintaining friendships are also responsible for subdividing our friendship network into layers (the circles of friendship). Fig. 5 summarises this. The total number of meaningful friendships we can is around 150. These are divided into a series of layers that have quite specific numbers: 5 close friends, 15 best friends, 50 good friends and 150 friends, with these layers counting cumulatively – in other words, the 15 best friends includes the 5 close friends, the 50 good friends includes the 15 best friends, etc. The members of the 150 circle may not provide such considerable health benefits as those in the 5 circle, but they contribute in smaller ways both in terms of our ability to cope with the wider world by providing other kinds of social and economic support, and as a reservoir of trustworthy people that we can move up into the inner layers should a member of these layers move away or die, leaving an empty slot.

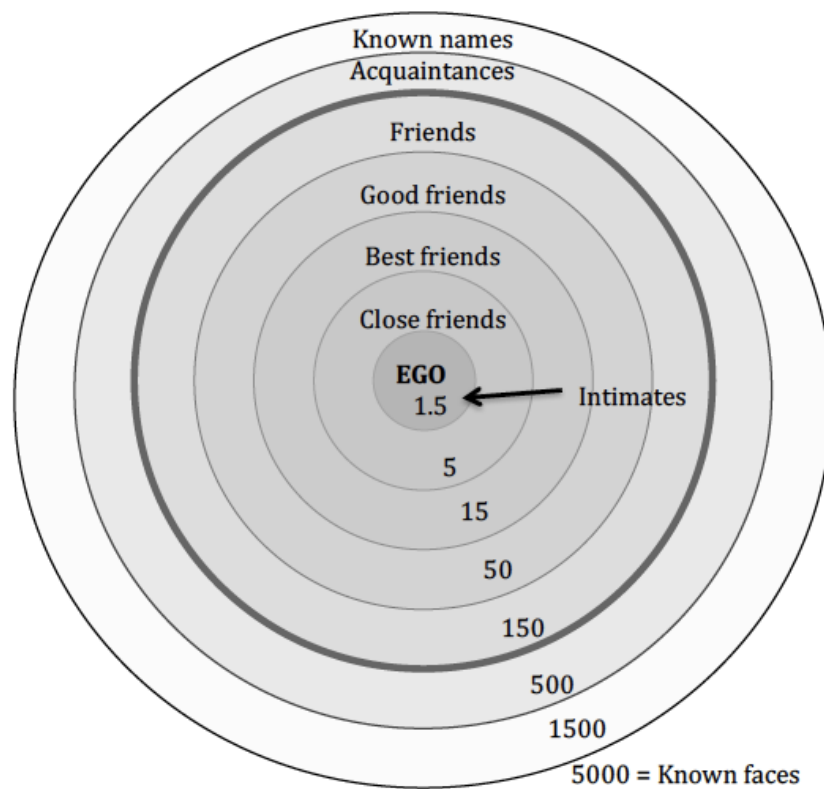


Fig. 5. The circles of friendship. Our social networks are defined by a series of subgroups that differ in the frequencies with which they are contacted. This gives rise to an embedded series of circles that increase progressively in size (i.e. include more individuals), but decline in terms of both frequency of contact and rated emotional closeness. The sizes of successive layers are cumulative (i.e. each layer includes the individuals in the circle immediately inside it). The dark line at 150 demarcates the basic personal social network (known as Dunbar's Number) that consists of reciprocated relationships that have a history. Beyond 150 lie three more layers defined by more transactional relationships that are less likely to be reciprocal. Reproduced from Dunbar (2025).

Beyond the 150 lies several further layers of people we know, but wouldn't count as meaningful friends. These include a layer of "acquaintances" (many of these will be people we work with), a layer of familiar people (people whose faces we recognise and names we know, but about whom we know very little), and finally a layer of faces we recognise (but whose names we don't know). Beyond the 5000 people in this last layer, everyone is a stranger: we don't recognise them as someone we have seen before. What differentiates these three outermost layers from the four inner ones (i.e. those inside the 150 layer as opposed to

those outside it) is that the relationships in the outer layer are more transactional (I will help you only if you promise to help me later), are shallower in terms of both emotional closeness and how long we have known the person, and our willingness to act altruistically towards them.

One final feature of our social network in Fig. 5 is kinship, or family. I refer to all the 150 members of our social network as ‘friends’, but in reality some of them are family. All the people we have in our extended family, including in-laws, are normally included within the 150 layer. In small scale or traditional societies where families are often large, the whole 150 will consist entirely of family members or adoptive family members. In many modern industrial societies, however, family sizes are small, and the number of kin we have can account for as few as half of our 150 network members. We fill the empty slots with friends (i.e. people who are not related to us by kinship). Even when we do so, however, we still give priority to kin (the so-called ‘kinship premium’: Curry et al. 2013). Moreover, when given a choice between helping a family member or a friend, we invariably give preference to the family member (Curry et al. 2013).

While we have to invest considerable amounts of time to maintaining relationships in the innermost circles, those in the outer circles require must less time and effort. What holds them in place is both a combination of family relationships and the depth of history: in both cases, these are usually people we have known for a long time, many of whom, at different times in the past, may actually have been members of the inner circles. They are people whom we are now no longer quite so emotionally close to as we once were, but whom we do not wish to abandon altogether (such that they slide out of our 150 into the layer of acquaintances beyond).

Discussion

I have tried to summarise both the processes involved in friendship formation and the consequences that friendship has for our health and wellbeing, as we currently understand these. The second of these is much underestimated, especially in a medical environment that focusses on drugs as the solution to all problems. Without disputing the fact that drugs can be very effective in curing many physical and psychological ills, the important lesson is perhaps that engaging with friends (and family, of course) can bring major benefits as a form of ‘natural’ medicine. Of course, while the solution to many problems is easy to see (just find a friend!), actually this is much more difficult. This is because friendship is a two-way process: you cannot force people to be friends with each other. Both parties must be willing to be friends with each other, both need to have time to devote to each other otherwise a` friendship cannot develop. This is probably why homophily plays such an important role in friendship, since similarity on many traits makes two people more interested in being friends because they satisfy each other’s requirements.

This raises the central problem in friendship formation: finding someone who matches you can be very time consuming. Often we are, instead, obliged to be satisfied with someone who is less than ideal but will suffice for the time being. Such friends are often people who have the advantage of being both accessible (i.e. they live near us, so we can meet and see them easily) and available (i.e. they are also looking for a friend at the time we first meet them). Such friendships will, of course, be relatively weakly bonded right from the start, and may easily break up if one party finds someone who is more congenial. Friendships are never stable over the long haul. Instead, relationships change over time, and friends move between circles (Saramäki et al. 2014; Roy et al. 2022; Kempnich et al. 2024).

Nonetheless, friendship is probably the best and most beneficial of all the gifts that we humans have. Without friendship, life is not just less interesting and enjoyable but is also more likely to be one that is blighted by depression and physical ailments. Making room for others is not, of course, always easy – we are all busy with family, jobs and existing friends. However, friendship is also a community responsibility since friendly communities are invariably happy and contented communities. Finding ways to make communities friendlier is something that governments should seek to make possible and we as individuals should try to implement.

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