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Abstract: The growth of self-tracking and personal surveillance has given rise to the Quantified Self movement. Members of this movement seek to enhance their personal well-being, productivity and self-actualization through the tracking and gamification of personal data. The technologies that make this possible can also track and gamify aspects of our interpersonal, romantic relationships. Several authors have begun to challenge the ethical and normative implications of this development. In the present article, we build upon this work to provide a detailed ethical analysis of the Quantified Relationship (QR). We identify eight core objections to QR and subject them to critical scrutiny. We argue that although critics raise legitimate concerns, there are ways in which tracking technologies can be used to support and facilitate good relationships. We thus adopt a stance of cautious openness towards this technology and advocate the development of a research agenda for the positive use of QR technologies.

1. Introduction

The growth of self-tracking technologies has been breathtaking (Lupton 2016; Neff & Nafus 2016; Kelly 2016). Many people now carry on their person a device, such as a smartphone or smart watch, that is capable of logging and tracking¹ numerous data points about their daily lives. Some of this data is logged voluntarily and with conscious effort; some of it is logged in the background, automatically. With the rise of wearable technologies and the “Internet of Things” (the vast network of interconnected physical devices sending and receiving information via embedded electronics; see Greengard 2015), the trend toward increased self-tracking is only set to continue.

This trend has inspired the Quantified Self movement, originally started by Silicon Valley mavens Kevin Kelly and Gary Wolf (Kelly 2016; Wolf 2009 & 2010).² The movement is premised on the belief that self-tracking technology has great promise when it comes to self-actualization, productivity, health, and personal well-being. This belief, in turn, stems from the assumption that we humans are selective, biased, and error prone when it comes to understanding the variables that affect our day-to-day lives. Self-tracking, it is claimed, can help to eliminate these putative shortcomings. Furthermore, by leveraging the social and gamified aspects of technology, self-tracking can, according to its proponents, be used to encourage positive behavioral changes (cf. Lanzing 2015; Hare and Vincent 2016).

¹ One might wish to distinguish between these terms on the basis that logging requires voluntary effort to input data whereas tracking takes place automatically once a device is switched on; however we will use the terms interchangeably.

² The movement has its own webpage, with extensive information about Quantified Self technologies, meetups and conferences – www.quantifiedself.com (visited 22/8/2016).

Such potential benefits may also extend beyond the self. Indeed, the same sort of technology can and is being used to track aspects of people's intimate interpersonal relationships, including their sexual and romantic behaviors (Lupton 2015; Levy 2014). In this domain, too, what is promised is better knowledge of how people and their partners think, feel, and behave, which can then plausibly be used to improve their relationships. Elsewhere, we have argued that romantic relationships can have a very high intrinsic value (Nyholm 2015a-b) as well as a strong instrumental value for health and wellbeing (e.g., Earp et al. 2012, Wudarczyk et al. 2013). Since relationship-tracking technologies are likely to proliferate over time, and since they may plausibly have a significant impact on some of our most valued human relationships, the Quantified Relationship (QR) phenomenon seems worthy of inquiry. The goal of this article is to pursue such an inquiry and to subject QR technologies to an ethical assessment.

Our focus is on intimate interpersonal relationships, which we also refer to as romantic relationships throughout. Although there is unlikely to be a set of necessary and sufficient conditions for defining such relationships, we trust that most readers' intuitive sense of those terms (and the range of cases to which they apply) will be adequate for our arguments to make sense. That said, "romantic relationship" might usefully be thought of as a cluster concept, with paradigmatic examples in the middle, and less paradigmatic examples clustered around it, each one differing along various dimensions (e.g., the degree to which sexual interaction is central to the relationship). Reasonable people will disagree about the "weight" that should be assigned to each of those dimensions in terms

of their importance for picking out the concept; and they may disagree about which dimensions are even relevant to begin with (for a related discussion, see Earp, 2016). Nevertheless, again, we expect that the “clusters” and “dimensions” that most readers have in mind will overlap substantially (see, e.g., Nyholm & Frank, 2017: 226), and will therefore not pose an obstacle to understanding our ideas.³

In assessing the QR phenomenon, we aim to make three main contributions. The first is to catalogue and summarize the major criticisms of QR technology that have been suggested in the literature. The second is to subject those criticisms to philosophical and ethical scrutiny. The third is to use this analysis to develop a roadmap for future inquiry in this area. Many of the existing contributions to this debate have been suspicious of QR technology, and in our view the critics raise legitimate concerns. Nevertheless, we shall attempt to take seriously and give thorough consideration to some of the ways in which QR technologies might also be beneficial. Insofar as the critics are onto something, then, we suggest that their objections should be reinterpreted as identifying crucial guidelines to be respected or areas requiring caution, rather than as posing an insurmountable road-block to the ethical use of QR technologies.⁴

³ All of that said, we do wish to note that while many of the QR technologies we discuss focus on sexual behaviors, we do not consider that “intimate” or “romantic” relationships must necessarily involve sexual interaction. Some might wonder, then, what distinguishes such non-sexual intimate or romantic relationships from “mere friendship,” and our answer is that there is no clear-cut line. Instead, using the cluster concept approach, there will only be relatively more or less proximate clusterings around paradigmatic cases; readers can decide for themselves where the boundary—however vague it may be—lies within their own minds, and evaluate our arguments and examples accordingly.

⁴ In this manner, we highlight the similarity between the use of QR technologies and the use of enhancement technologies more generally in intimate relationships (e.g., Earp et al. 2013; Wudarczyk et al. 2013). With respect to the latter, it has been argued that some of the main

We proceed as follows. In Section 2 we clarify what we mean by the Quantified Relationship and identify some of the apps and technologies that currently support it. In Section 3, we identify and articulate eight objections to relationship-tracking. In Section 4, we subject these objections to critical scrutiny. And in Section 5 we point the way forward.

2. What is the Quantified Relationship?

The Quantified Relationship is characterized by three inter-related phenomena:

Intimate Tracking: The collection of data arising from intimate behaviors (Lupton 2015), e.g., the tracking of sexual behavior (number of sexual encounters; duration; heart rate reached during sexual encounters; decibel level, etc.) or ‘romantic’ behaviors (number of gifts purchased, household chores done, messages/cards sent, conversations had, etc.).

Intimate Gamification: The use of gamelike incentives in order to change behavior within intimate relationships (McGonigal 2011; Maturo 2015; Maturo, Mori & Moretti 2016). These incentives could include leaderboards, badges, and awards given for achieving certain outcomes, (e.g., if you perform a sufficient number of romantic gestures you could be rewarded with an app-generated coupon that you could ‘cash in’ with your romantic partner).

concerns that have been raised so far should not be seen as ruling out the development or use of such technologies altogether. Rather, those concerns should be seen as helping us to avoid especially bad outcomes (and foster better outcomes) as different forms of relationship-enhancing technologies increasingly become available (Naar 2015; Earp et al. 2014, 2015, 2016; Gupta 2013)

Intimate Surveillance: The use of tracking technologies to surveil the behavior of your intimate partner(s) and not just to track your own intimate behaviors (Levy 2014).

We refer to any romantic relationship in which technologies are used to do one or more of these three things as a ‘Quantified Relationship’ (QR).⁵

To evaluate the QR phenomenon, we need first to give a sense of the apps and services that can be used to facilitate a QR. We refer to these as ‘QR technologies’. Smartphones, wearables (i.e., data-collection devices that can be worn on the body), and other Internet of Things (IoT) technologies already facilitate self-tracking, gamification and surveillance. Many of these services can be redirected toward intimate interpersonal behaviors. In addition, some such technologies have been designed specifically for QR purposes. Although this is a fluid and fast-changing field, with apps coming in and out of existence on a regular basis, we will take stock of the current situation. The table below summarizes some of the QR technologies that are available for smartphones and wearables as of the writing of this paper in early 2017.

⁵ This label is potentially misleading. While most of the apps and technologies we will discuss track and log *quantifiable* data (e.g., frequency and duration of sex), that is not all they do. In some cases, they also track and log *qualitative* data (e.g., the content of text message conversations). A similar problem applies to the ‘Quantified Self’ label (Lupton 2016). In the latter case, however, the term has already taken hold in popular discourse, such that the invention of a new term would only lead to confusion. Therefore, we have decided to use ‘Quantified Relationship’—by analogy—to emphasize the continuity of our discussion with that parallel phenomenon.

Technology	What does it do?
<i>SexTracker</i>	Logs number of sexual encounters; includes personal rating system; visual representation of number as flaming beads in a glass.
<i>SexKeeper</i>	App that tracks sexual encounters; covers frequency, duration, calories burned, and other health-related information; facilitates goal-setting and social-sharing.
<i>Nipple</i>	Tracks sexual activities; encourages you to input positions, place, number of orgasms, partner's name etc.; assigns points and includes a community leaderboard. ⁶
<i>Lovely</i>	Smart sex toy that fits around the base of the penis, intended to track calories burned, g-force and more.
<i>Between</i>	Private messaging for couples; creates special memory boxes; tracks number of days together.
<i>Couplete</i>	Private messaging platform; allows you to create a shared relationship story and sync to-do lists with your partner.
<i>Avocado</i>	Private messaging platform for intimate partners; syncs calendars; creates shared to do lists; stores memories and moments from the relationship.
<i>Kouply</i>	App that turns your relationship into a game; awards points for romantic gestures; includes a leaderboard to compete with other couples.
<i>Goodforapp</i>	App that allows couples to create personalized coupons.
<i>Glow</i>	Fertility tracking app; encourages user to log information about mood, position during sex and other intimate details; has considerable social-sharing features; tips and advice given via the app; encourages sharing of information between partners.
<i>Glow Nurture</i>	Pregnancy tracking app; encourages users to log information daily about mood, health, exercise and so on; encourages sharing of information between partners, includes tips for non-pregnant partner on how

⁶ This app can be used either in- or outside the context of a relationship. We are here primarily interested in its potential uses within a specific relationship.

	to help their partner feel better, etc.
<i>Flexispy</i>	Covert surveillance app; allows you to track messages on your partner's phone; track the location of your partner's smart device; and listen/look in on audio and video.
<i>Loving Couple Essential</i>	Private messaging app that allows you to chat and share photos with, and to track the location of your partner when the app is switched on; also includes period tracking.
<i>LoveByte</i>	Shared timeline and homepage app, which also allows you to locate your partner when the app is switched on.

Table 1. Summary of QR technologies available in early 2017

The technologies listed above can be divided into three main categories. The first consists of *sex tracking* apps. These apps track data about your sex life, including: the number of partners you have had; the number of 'sessions' per partner; the sexual positions used during these sessions; the number of thrusts per session; the duration of these sessions; the number of calories burned per session; the decibel level reached during each session, and so on. Some of this information is voluntarily logged by the user; some of it is automatically tracked once the app is switched on during a sexual encounter. Apps in this group include the now-defunct *Spreadsheets app*,⁷ along with *SexTracker*,⁸ *SexKeeper*⁹ and *Nipple*.¹⁰ Many of these apps include gamification elements. For example, *Nipple* adopts a points-based scoring system and includes a public leaderboard

⁷ See 'Spreadsheets App Good in Bed', *Huffington Post* 13th August 2013 - http://www.huffingtonpost.com/2013/08/13/spreadsheets-app-good-in-bed_n_3748719.html (accessed 13/1/2017)

⁸ See <https://itunes.apple.com/us/app/sextracker/id498388008?mt=8> (accessed 13/1/2017)

⁹ See <http://www.sexkeeperapp.com> (accessed 13/1/2017)

¹⁰ See <http://nipple.io/about> (accessed 13/1/2017)

featuring the top sexual ‘performers’ each week. Some sex-tracking apps are tied to wearables, such as *Lovely*, which is a smart sex toy that fits around the penis and tracks calories burned, intensity of sex (g-force) and more. *Lovely* was launched at the start of 2017.¹¹ Somewhat similar is *kGoal*, a smart kegel exercise device that can be used by women to tone their pelvic floor muscles.¹² In addition to its uses outside the relationship context, this device’s touted benefits include improvements to ‘intimate well-being’ (illustrated on its seller’s website by two intertwined hearts). The *kGoal* provides visual feedback about workout sessions to users via a smartphone app, which also includes gamification elements.

The second group consists of *romantic behavior* tracking apps. Some of these are simple private messaging systems that allow couples to collate and track personal communications, photos, and experiences, thereby creating a shared storehouse for their relationship. Examples include: *Couplete*,¹³ *Avocado*,¹⁴ *Couple.me*¹⁵ and *Between*.¹⁶ Some of these apps allow couples to sync their to-do lists and calendars and create shared relationship goals and stories. Perhaps more interesting are the apps that try to gamify relationships such as *Kouply*¹⁷ and *Kahnoodle*.¹⁸ These apps record ‘romantic’ gestures within relationships (gifts purchased, feet rubbed, trash bags taken out, dates held,

¹¹ See <https://www.ourlovely.com> (accessed 21/3/2017)

¹² See <http://www.minnalife.com/products/kggoal> (accessed 13/1/2017) and also <http://www.theverge.com/2015/1/26/7892551/kggoal-kegel-exercises-device-review> (accessed 13/1/2017)

¹³ See <http://couplete.me> (accessed 13/1/2017)

¹⁴ <https://avocado.io>

¹⁵ See <https://couple.me> (accessed 13/1/2017)

¹⁶ See <https://between.us/?lang=en> (accessed 13/1/2017)

¹⁷ See <https://itunes.apple.com/us/app/kouply/id499184239?mt=8> (accessed 13/1/2017)

dinners prepared, etc.) and assign points to users. *Kouply* even includes leaderboards that allow the partners to compete with other couples. There are also many apps that allow couples to track fertility-related information. The best-known among these apps (*Glow* and *Glow Nurture*)¹⁹ have behavior change goals embedded within them and encourage the sharing of information between intimate partners. The apps also offer advice to partners of pregnant women on how to treat and look after them during pregnancy. Some fertility tracking apps are aimed squarely at heterosexual men, providing them with information about their partner's menstrual cycle and supposedly likely mood during this cycle. Noteworthy examples include *Fredrick* and *Shvrk* both of which launched in 2016 only to be removed from the App Store after public outcry.²⁰

Finally, there are *surveillance* apps, *i.e.* apps that allow you to track and monitor your partner's data—sometimes with, and sometimes without, their consent. Many of the apps described above necessarily include some element of interpersonal surveillance since they encourage partners to share information. But some apps go further and allow you to know where your partner is and to see what they are up to. For example, *Loving-Couple Essential*²¹ is an app that allows you to see where your partner is (whether awake or sleeping) and to wake them up with a loud noise at the press of a button.²² Similarly, *LoveByte*²³

¹⁸ For details, see 'Kahnoodle Makes Reigniting Your Relationship into a Game', *Huffington Post* 9th August 2013 - http://www.huffingtonpost.com/2013/08/09/kahnoodle-app-makes-reigniting-your-relationship-into-a-game_n_3732916.html (accessed 13/1/2017)

¹⁹ See <https://glowing.com> (accessed 13/1/2017)

²⁰ For details on both, see <https://mic.com/articles/133048/download-fredrick-a-period-tracking-app-for-men> and <http://nypost.com/2016/02/21/students-create-app-that-tracks-partners-menstrual-cycle/> (accessed 13/1/2017)

²¹ See <http://loving-couple-essential.soft112.com> (accessed 13/1/2017)

²² A reviewer on this paper wonders how this is any different from just calling your partner and waking them with a ringtone. One difference is that, with the app, you can actually see where the partner is—via coordinates on a digital map—when certain settings are activated, before

allows you to locate your partner whenever the app is in use and the relevant settings have been switched on. There are also more blatantly sinister apps, like *Flexispy*,²⁴ which allow for covert surveillance of the messages and calls on your partner's phone, enable geolocation of the phone, and facilitate remote listening- or looking-in by switching on the video or mic on the phone.

Given how embedded surveillance is in digital technologies generally (Kelly 2016), one suspects that many more apps and devices will be created in the coming years to further facilitate tracking, gamification, and surveillance of intimate relationships and associated behaviors. But what are the social and ethical implications of this likely development?

3. Eight Objections to the Quantified Relationship

remotely setting off the alarm; and the alarm itself may also differ from a standard ringtone (for example, by being more strident). Depending upon the spatial resolution of the map and the accuracy of the coordinates, you might be able to infer that your partner is in, say, the bedroom (although this still does not ensure that they are sleeping). With a regular phone call, by contrast, you don't typically know where your partner is unless you have some prior arrangement or understanding, or you draw a more general inference from, e.g., the time of day it is and what you know about your partner's usual schedule. Nevertheless, we admit that "line" between what you can do with this specific app, and what you may be able to achieve by other technologically-mediated means, whether now or in the future, is blurry. Thus, when it comes to evaluating the ethical status of any particular QR technology, it will be important to get clear about the details. An app that allows you to activate an alarm on your partner's phone, even if it is on silent mode, for example, is importantly different from just calling your partner under the same conditions and going straight to voicemail (it is unclear from the online description of the alarm function in *Loving-Couple Essential* which of these is closer to the mark). Similarly, an app that allows you to switch on the camera from your partner's phone at any time, with or without their consent or awareness, will present very different ethical challenges compared to an app that merely allows your partner to voluntarily send you their geospatial location (the former does not appear to be possible with *Loving-Couple Essential*, although other technologies do allow this—see our above reference to *Flexispy*). As a more general point, we stress that the novelty of the app-based possibilities we discuss is not what is of greatest ethical interest. Indeed, it has been possible for people to quantify aspects of their intimate relationships for centuries. What matters, rather, are the uses to which current and future tracking technologies are likely to be put, the ease with which they can be put to such uses, the scope of the tracking they facilitate, and so on.

²³ See <http://lovebyte.us> (accessed 13/1/2017)

²⁴ See <https://www.flexispy.com> (accessed 13/1/2017).

Some authors have expressed serious concerns about the use of QR technologies (e.g., Lupton 2015; Levy 2014). Here, we outline eight prominent objections to the Quantified Relationship in an attempt to collate, add to, and systematically evaluate the sorts of concerns that one might have in this area. We begin by stating the objections, as clearly and as charitably as we are able, deferring our assessment of them to a following section.

The first objection is what we will call the *inefficiency objection*. Although this objection does not seem to have been discussed in the literature about QR technologies to date, it has been widely discussed in relation to self-tracking more generally. It begins by conceding that the apps and technologies in question succeed in identifying appropriate goals – i.e., goals that, if achieved, would genuinely improve one’s relationship – but states that they are not particularly effective tools for achieving those goals. The objection holds that people are unlikely to reliably change their behavior in response to the relevant technologies. So, while it might be a good idea, all things considered, if you performed more romantic gestures in your relationship, or if you tried to extend the duration of your sexual interactions,²⁵ simply downloading and using an app like *Kouply* or *SexKeeper* will not cause you to do those things successfully. You might be initially enthused about the app and the data it logs, but you will soon grow bored and revert to baseline.

The second objection is almost the inverse of the first. It concedes that the apps may do a good job of changing our behavior but states that this is

²⁵ To be clear, we don’t endorse this view here. We simply raise it *arguendo*.

problematic because such changes are ultimately in service of the wrong kinds of goals. We will call this the *measurement-management* objection, in light of the saying that what gets measured gets managed. This worry typically gets cashed out in two different ways. The first (contingent) way criticizes the misleading and unhelpful measurements and assessments that happen to be used by particular apps and devices. The second (necessary) way criticizes the more general fixation on *quantity* rather than on *quality* (i.e. of relationship characteristics) encouraged by these technologies as such.

Take the sex-tracking apps as an example. These apps encourage users to optimize sex-related performance metrics like duration, number of thrusts, decibel level reached, and so on. Suppose that the apps are incredibly effective at getting us to optimize these metrics. Would this be a good thing? No, according to the objection, because these metrics are not indicative of good quality sex, much less good relationships. It is either completely wrong-headed to focus on measures of this sort or, even if slightly on track, only a small part of the overall picture. Deborah Lupton gives voice to the worry:

Sexual activity becomes reduced to “the numbers”: how long intercourse lasts for, how often it takes place, how many thrusts are involved, the volume of sound emitted by participants, how good it is and with how many partners... These technologies therefore act to support and reinforce highly reductive and normative ideas of what is “good sex” and “good performance”

(Lupton 2015, 446-7)

The same basic logic applies to other forms of intimate tracking and gamification. Using an app like *Kouply* might encourage you to take out the trash, rub your partner's feet every day, and cook romantic meals three times a week, but this doesn't necessarily make for a happy and well-functioning relationship.

The third objection takes a more specific view of what makes for a good relationship. We call it the *informal-reciprocation* objection. The idea behind this objection is that well-functioning relationships thrive on informal, non-quantified acts of reciprocation. The partners to the relationship do things for one another but they don't actively keep score of who does what for whom (see Clark & Mills 1993). Formal, exchange-based relationship models might be appropriate elsewhere in human social life, such as in business or commerce, but not in intimate relations. The fear is that apps that encourage you to track and log data about your relationship will encourage a shift to a more formal, exchange-based model. Karen Levy expresses this fear:

... apps that quantify or calculate previously incommensurable aspects of intimate relationships may create new motivations for certain behaviors. For instance, regarding Kahnoodle and other romance quantifiers, psychologist Eli Finkel suggests that gamification may foster a tit-for-tat 'exchange mentality' that is ultimately detrimental to the foundations of intimate relations, and ultimately divests romantic gestures of their meaning.

(Levy 2014, 689)²⁶

²⁶ The reference to Finkel goes back to Susie Neilson, 'When a Relationship Becomes a Game', *The Atlantic* (Aug. 8, 2013) <http://www.theatlantic.com/health/archive/2013/08/when-a-relationship-becomes-a-game/278459/>.

The fourth objection also takes a stance on what makes for a good relationship. We will call it the *mutual-trust* objection. The essence of this objection is that well-functioning relationships are built on a foundation of mutual trust. The partners to such a relationship respect and trust one another. They are not suspicious, jealous, or disloyal.²⁷ The concern is that since (some) QR technologies encourage a degree of surveillance, they will corrode this mutual trust. The fear of being found out will replace trust. Again, Levy expresses this concern quite nicely:

Trust has long been an essential foundation of intimate relations and an important motivator of prosocial behavior. If partners remain faithful because they're afraid of being "tattled on" by digital technology, rather than out of a sense of loyalty to their partner, does fidelity retain its longstanding social and emotional significance?

(Levy 2014, 689).

The fifth objection highlights a general tendency in self-tracking technology that seems oddly destructive of important human values. We will call it the *instrumental vs. intrinsic value* problem. The gist of this objection is that certain human activities derive most, if not all, of their value from their intrinsic character. They are to be pursued not because they are in some way instrumental to other goods, but because they are worthwhile in-and-of-themselves. Human love is often claimed to be just such an intrinsic good

²⁷ Or if they are disloyal, this is part of an open agreement with their partner(s).

(Nyholm 2015a-b; but see Earp et al. 2016). According to this view, a loving relationship should rightly be pursued for its own sake, not for the sake of something else. Likewise, a good sexual experience, one that is mutually desired and mutually fulfilling, is to be valued *per se* and not in service of some end.

It might seem odd, then, that so many of the QR apps appear to instrumentalize good relationships and good sex by tying them to other values. In theory this instrumentalization could take many forms, but in practice the self-tracking industry tends toward medicalized or 'healthized' forms of instrumentalization (Maturo 2015). This could be taken to suggest that good relationships should be valued because, or only insofar as, they improve physical health and mental well-being. Think of the calorie-burning features in several of the sex trackers. These features encourage us to think of good sex as a tool for getting in shape, not as an end in itself:

The association of sex with burning calories also suggests the concept of sexual activity as a physical exercise like running or swimming, to be engaged in as part of fitness or weight-control pursuits ...

(Lupton 2015, 447)

Nyholm (2015b) calls this instrumentalization of what should properly be considered intrinsically valuable an *evaluative category mistake*.

The sixth objection takes a political turn. It highlights the *gendered* nature of these technologies, noting how they tend to construct women especially as objects to be surveilled and quantified, and how they impose normative standards on both men and women that perpetuate problematic gender stereotypes.²⁸ Lupton highlights some of these concerns as they relate to sex-tracking apps:

Gender stereotypes are reinforced by the focus on male performance ... to become highly ranked as a Don Juan or top sexual performer', men must achieve the norms set by the algorithms of these devices as desirable evidence of superior sexual prowess.

(Lupton 2015, 447)

Levy highlights the problems in relation to female surveillance:

... it is striking how many technologies of intimate surveillance construct women, in particular, as monitored subjects. From women's bodies and cycles to their whereabouts, communications, and activities, services from Glow to Wife Spy to Girls Around Me expose women especially to data collection, invasive monitoring, and increased visibility.

(Levy 2014, 688)

²⁸ We assume a gender binary here because most of the apps seem to assume a gender binary. But there is no reason why QR technologies could not be targeted at persons who do not conform to such a binary (e.g., intersex individuals).

The seventh objection is also political in nature. We call it the *neoliberalization objection*. It suggests that QR technologies are part of the more general neoliberal political project, and that this is bad, all things considered, because that project is bad. To give the objection more flesh, the idea is that the neoliberal project promotes the atomization of society, such that individuals are encouraged to take personal responsibility for all aspects of their lives (their health, their employability, their productivity, their happiness and, of course, their relationships). This is problematic because it suppresses or ignores the systemic causes of ill-health, unemployment, unhappiness, and potentially also bad relationships:

The practices of wellness and self-quantification these technologies champion comply with an increasing focus in neoliberal politics on emphasizing the personal behavior and self-responsibility of citizens. This is occurring simultaneously with the withdrawal of state funding for social support and healthcare programmes.

(Lupton 2014, 449)

The problem with shifting focus to individuals is that this can actually disincentivize more stable structural solutions.²⁹ A similar point could be taken to apply to QR technologies. Well-functioning relationships, at least, require

²⁹ As Barbara Wootton once noted, it is far easier to “put up a clinic,” in order to treat individual symptoms of some widespread problem, than it is “to pull down a slum,” that is, the ultimate source of the problem (Wootton 1959).

some degree of community support—not just individualized quantification and atomistic responsibility.

There is one final objection to the Quantified Relationship, which can be described simply as the *privacy objection*. It is evident that surveillance-oriented QR technologies pose a significant threat to privacy. App-makers in general Hoover up personal data, usually in the hope that these data can be commodified at a later stage. They often do so in a less-than-fully-transparent fashion, making the default settings on their apps ones which permit general sharing of personal information, and burying the details in complex user license agreements that almost no one bothers to read (Youmans & York, 2012). In the case of QR technologies, the privacy threats come from two directions: from the app-makers who collect data from users, and from the partners to the relationship who collect data about one another. This is undoubtedly a very serious concern. Even within intimate relationships there are zones of privacy that are (and plausibly should be) respected by the partners. For instance, spying on your partner while they use the bathroom transgresses norms of privacy in many Western cultures. However, we will not pursue such privacy-related objections in what follows, for two reasons. First, some (but certainly not all) of the relationship-specific privacy threats are captured by the mutual-trust objection that we outlined above. Second, the general privacy-related threats in this domain are already widely-discussed and debated in other contexts (e.g., Solove 2004). We want to limit our focus, in this paper, to the more relationship-specific problems.

The table below summarizes the eight objections we have just outlined.

Objection	Description
<i>Inefficiency Objection</i>	The apps/technologies encourage us to focus on the right things, but they aren't very effective in getting us to change our behavior.
<i>Measurement-Management Objection</i>	The apps/technologies change our behavior, but this is problematic because they get us to focus on the wrong things. They emphasize quantity over quality; they are reductive. The objection comes in a <i>contingent</i> form (which calls into question the current measurements) and a <i>necessary</i> form (which challenges the measurement ethos more generally).
<i>Informal-Reciprocation Objection</i>	By quantifying and gamifying our relationship data, the apps/technologies encourage us to shift to formal, exchange-based models of relationships. Healthy relationships are not built on this model; they are built around informal reciprocation.
<i>Mutual Trust Objection</i>	By encouraging partners to track information about each other (sometimes covertly) the apps/technologies corrode the mutual trust that is needed for a well-functioning relationship.
<i>Instrumental vs Intrinsic Value Problem</i>	The apps/technologies encourage an instrumental view of the value of love. They encourage us to see the benefits of a well-functioning relationship in terms of health and well-being; not in terms of qualities that are intrinsic to the relationship itself.
<i>Gendered Relationship Objection</i>	The apps/technologies reinforce problematic gender roles/stereotypes within relationships, and may be especially harmful to women.
<i>Neoliberalization Objection</i>	The apps feed into the neoliberal political project.

	They prioritize individual responsibility over systemic change, thereby ignoring or suppressing the fact that good relationships depend upon well-functioning communities and other contextual supports.
<i>Privacy Objection</i>	The information that is tracked, logged, and quantified by these apps/technologies poses a threat to privacy.

Table 2. Major objections to QR technology

4. Evaluating the Objections to the Quantified Relationship

We now proceed to the critical evaluation of these objections. We argue that each objection has some legitimacy, but none should be mistaken for a knockdown argument against the development or use of QR technologies. Provided that app designers and distributors can be held accountable for clearly unethical features (whether by social pressure or more formal regulation), and provided that relationship partners deploy whatever QR technologies do exist in a non-reckless fashion, it would premature to conclude that the use of such apps would necessarily corrode or undermine core relationship virtues. On the contrary, the informed and thoughtful use of QR technologies could promote and encourage more positive intimate relationships.³⁰

³⁰ In one sense, this analysis could be seen as too simplistic, insofar as one believes that no technology is inherently bad, but rather (and because) “it all depends on how it is used.” We disagree with this view, however. Following the work of technology theorists such as Lewis Mumford (2010), we believe that some technologies can be value-laden, i.e. that their design can intrinsically bias us in particular moral directions, whether positive and negative. Indeed, many of the objections we outline above presume such a view and argue that QR tracking apps are precisely the sort of technology that may bias us in such a way, albeit more often in an unproductive or negative direction. We then respond to this possibility by highlighting some of the more positive orientations that also exist within these technologies, and by suggesting ways in which users might push back against the more negative orientations.

This position of cautious openness emerges from our commitment to three propositions:

A. There is no single, widely-accepted and normatively persuasive model of what makes for a ‘good’ intimate relationship – that is to say, the current so-called Western convention in favor of universal, lifelong monogamous pair-bonding arising from mutually-declared love is both historically recent (Coontz 2006) and normatively questionable (Anderson 2012; Jenkins 2017; Munson & Stelboun 2013). It may provide a good structure for the flourishing of some, or even many, romantic relationships, but it is not the only such structure, and it may not work optimally for everyone in every context (Earp & Savulescu in press). Many different relationship models have flourished in different times and places. We should not presume a ‘one size fits all’ approach (Gupta 2012). Moreover, even if we do focus exclusively on the Western model, and rely on popular analyses of this putative ‘ideal’, we quickly find that the features typically singled out as key aspects of ‘ideal’ relationships are broad enough to allow room for creativity in realizing them in concrete terms.

For example, philosophers have identified the following considerations as characteristic of ‘good’ romantic relationships: being a ‘good match’; valuing each other in one another’s particularity; giving each other affection and care in a robust and steadfast way; valuing the shared history that the lovers build together (e.g. Kolodny 2003; Pettit 2015; Nyholm & Frank 2017). Notably, these characteristics of ‘good’ intimate relationships are all general enough to allow for a wide range of more specific interpretations of what exactly individual

relationships ought to be like in order to fulfill such aspirations. Plausibly, it is part of building a good relationship together that lovers create their own shared, more specific take on what is needed to give each other the goods associated with romantic love.

That being said, we concede that many of the QR technologies we discuss seem to presume, at least implicitly, a relatively narrow relationship model, or actively reinforce one. Thus, it might seem that there is a tension between our “cautious openness” toward these technologies, on the one hand, and on the other hand, the normative proposition we have just adopted concerning the absence of single ‘ideal’. But this tension can be resolved. *Insofar* as QR technologies allow partners from across the full range of plausibly good relationship models (including “conventional” ones) to improve their relationships in a way that is consistent with their deepest values, there is no problem in this respect, and we retain our cautious openness. But by the same token, insofar as particular QR technologies, or QR trends more generally, serve only to reinforce a single, narrow, and normatively questionable relationship model, then our stated principle goes back to weighing against them. Indeed, we believe that app makers, themselves, should be wary of a ‘one size fits all’ assumption about what constitutes a good relationship (although the development of different apps by different makers could potentially help with this issue); and it is precisely these sorts of concerns—and the need to formulate an appropriate response—that make the wider ethical debate we hope to stimulate with this article so timely and essential.

B. Autonomy, agency and consent are important properties of good relationships – despite what we just said, we are not neutralists or relativists when it comes to romantic relationships. We do not claim that ‘anything goes’ (see Shweder 2012). There are some foundational normative constraints. In particular, we assume that good relationships must be founded in a mutual commitment to the autonomy, agency³¹ and consent of the relationship partners. All else being equal, *they* should determine the specifications that make for a good relationship for themselves, while being sensitive to the fact that some relationship partners have more bargaining power than others and some relationship partners occupy privileged social positions that should be questioned and, if necessary, counteracted.

C. The relationship status quo is non-ideal – that is to say, romantic relationships are often morally problematic, regardless of the use of QR technologies. The parties to relationships can be unjustly or unproductively jealous (Earp & Savulescu in press), as well as petty and abusive. Many people are trapped in loveless, harmful, or toxic relationships due to personal and social circumstances. Moreover, inappropriate power imbalances, unfairly asymmetric gendered expectations, and unwarranted suspicion are already widespread in intimate contexts. These problematic features of the relationship status-quo

³¹ We use the term agency in an appeal to feminist theory (Abrams 1998). Some feminists reject the use of concepts like freedom and autonomy on the grounds that they presume an overly dualistic and atomistic understanding of human behavior. Autonomy, for them, signifies a rational individual standing free from social forces of determination. ‘Agency’ is proposed instead of autonomy on the grounds that it presumes that the individual is always shaped by and constrained within a network social practices and discourses. An individual can have more or less agency, depending on how these practices and discourses operate. Men, typically, have more agency than women due to their privileged position within the network of social practices and discourses. The arguments and evaluations we present in the text work, we believe, with either a contemporary, nuanced understanding of autonomy or a feminist understanding of agency.

should not be forgotten or ignored when evaluating the potential impact of a new technology (Bostrom and Ord, 2006).

This is not to say that romantic relationships *per se* should be seen as things that are “constantly on the verge of being broken and must be fixed,” however, a view which has the potential to generate “problems where there weren’t any, since one is always focused on the potential shortcomings of one’s relationship.”³² We think that “non-ideal” should be taken to mean something less extreme than that, namely, that there is ample room for genuine improvement over the status quo. As we will argue, QR technologies could plausibly contribute to that end; but we acknowledge that they could detract from it as well. For example, if the implicit or explicit message of most QR technologies was not, “here are some ways that you and your partner(s) might genuinely improve your relationship,” but rather, “your romantic relationship is inherently doomed to failure, and only this app can save it,” that would be undesirable.

Of course, those two statements represent poles along a continuum, and we should be alert to any significant sliding from a position closer to the former pole toward a position closer to the latter: one can easily imagine QR marketing efforts designed to both fuel and capitalize on people’s relationship insecurities, and this would be problematic for similar reasons to those that apply to mainstream marketing strategies for many other products (see, e.g., Meixel et al. 2015). In our view, this general trend should be resisted (see Earp & Savulescu in

³² We thank an anonymous reviewer for raising this issue; the quotation comes from the reviewer.

press), but it is not clear that it constitutes a special problem with QR technologies. Moreover, we do not believe that the mere availability or use of a QR technology necessarily implies that your relationship, or relationships generally, are “broken,” as some might argue. This is because technologies designed for enhancement do not conceptually require a “problem” in need of fixing. In other words, they can be used to improve something over a given baseline without necessarily pathologizing the baseline (see, e.g., Earp, Sandberg, Kahane, and Savulescu 2014; Earp et al. 2015; Earp & Savulescu in press).

We do not propose to say more about these propositions here. Rather than attempting to establish their basic soundness, we will instead simply use them as a framework for our arguments in what follows. Thus, readers who reject our subsequent arguments may find that they do so because they disagree with one or more of these propositions. Nevertheless, as we proceed to evaluate the eight objections we have outlined in the following sections, we expect that the defensibility of our normative assumptions will make itself apparent.

4.1 – Evaluating the Inefficiency Objection

If we grant, *arguendo*, that QR apps and technologies discussed are designed to promote behaviors that lead to better relationships, how can we know whether they effectively promote those behaviors? This cannot be answered in strictly philosophical or ethical terms. In part, it is an empirical question – one that has not been explored much in the literature on relationship quantification. Indeed, it has not been explored much in the literature on Quantified Self technologies more generally. That said, there are certain theoretical frameworks that provide

good reason to think that some such technologies are likely to be effective, or at least could be made to be effective with the right kind of adjustments.

It is well-known, for example, that habit formation depends on three critical factors: cues, routines, and rewards (Wood and Neal 2007; Neal et al. 2012; Duhigg 2012). Many of the QR technologies discussed above try to facilitate habit formation using these three features. There is also a rich empirical literature on effective behavior change techniques (e.g. Michie et al. 2011 & 2013) and researchers have begun to use this literature to evaluate the effectiveness of quantification-oriented apps (Morrissey et al 2016). Initial pilot studies on mobile health and fitness tracking provide direct (albeit preliminary) evidence for the view that these technologies can successfully change behavior (Walsh et al. 2016; Gomez Quinonez et al. 2016; Ganesan et al. 2016). There are also some meta-analyses to support this contention in relation to older technologies, e.g., text messaging (Thakker et al 2016; Fedele et al 2017). Since relationship tracking and gamification are similar in many respects to health and fitness tracking more generally, it seems appropriate to reason by analogy from these studies to argue that QR technologies could indeed be effective in changing behavior.

Nevertheless, it is important to concede that apps of this sort can also be, and often are, ineffective. Many readers will have had the experience of downloading some app (whether of the QR variety or some other variety), finding it interesting for a short period of time, and then abandoning it before very long for various reasons. Others, however—perhaps those who are more

assiduous about uploading and tracking their data—may find the tracking and feedback more useful. This varied utility is to be expected. Indeed, it is very much in keeping with the spirit of the broader Quantified Self movement. That movement promotes *self-experimentation* through tracking: plausibly, couples too should be allowed to experiment with technologies of this sort in order to determine what does or does not work for them. If an app or service fails to prove useful, so be it. As long as the agency, autonomy, and consent of the partners is respected, experimentation with an app that *ineffectively encourages a positive tendency or behavior* seems likely to be relatively harmless.

4.2 – Evaluating the Measurement-Management Objection

What then of the opposite complaint: that these apps are problematic because they succeed in changing behavior, but in ways that are undesirable or should not be pursued? There is certainly something to object to here. Apps like *SexKeeper* and *Spreadsheets* do seem to take a highly reductive and troublingly masculinized view of what good sex consists in—and apps like *Kouply* and *Kahnoodle* may get relationship partners to over-prioritize behaviors such as gift-giving and chore-performance, to the point that they distract from less easily quantifiable aspects of good relationships. But the force of this criticism can be challenged. In this section, we argue that there is a positive role for at least some forms of relationship quantification.

Recall that there are two versions of this objection to contend with: a contingent version and a necessary version. The contingent version suggests that the metrics *currently* used by QR apps are misleading, in the sense of focusing

our attention on the wrong things. A person who holds this view, we think, should be challenged to come up with some account of the right—or at least a better—metric. Consider sex-tracking apps, which we shall use to illustrate this back-and-forth. If the number of thrusts and decibel level reached are not indicators of good sex (and we agree that they probably are not, at least in most cases), what, then, are good indicators? Depending on the answer, it may be possible for this alternative metric to be tracked and gamified by an app.

In response to this, one could argue that there are unlikely to be *any* objective, quantifiable indicators of good sex (and perhaps other aspects of relationships as well). Whether sex is good or not depends almost entirely on you and your partner(s)' occurrent subjective experience of it—something that is difficult to metricize, much less successfully measure. We are happy to grant this response. But 'difficult' does not imply 'impossible' and efforts to develop technologies that do monitor subjectively experienced aspects of sex are not necessarily doomed to failure. Indeed, at least some apps have tried to do just this—e.g., *Nipple*—by encouraging users to provide subjective assessments of the pleasure they derived from their experience. Whether that is a good metric or not is certainly debatable — and we will return to this issue in a moment — but it does suggest that the contingent form of the measurement-management objection is less compelling than it first appears: it is possible to replace a crude metric with one that gets closer to what is really important.

The second type of objection runs deeper than the first. Rather than raising doubts about the effectiveness of current metrics, or even likely future

metrics, this objection claims that tracking and metricization are *inherently* or *necessarily* problematic. For instance, with respect to the *Nipple* function we have just mentioned, some people³³ might find that such digital note-taking during or after a sexual encounter is “off-putting” or simply distracting. We do not deny that some people might feel this way. But the fact that some people find such tracking and metricization unpleasant or at odds with their preferences does not mean that everyone will or should. The idea that this is a ‘necessary’ or ‘inherent’ flaw is therefore misleading.

To highlight this point, we note that some forms of generally non-controversial sex and relationship therapy involve talking explicitly about—and even documenting—subjective aspects of one’s sexual or other relationship experiences, whether in the presence of one’s partner(s) or otherwise. Many people, including some who have experienced sexual abuse or other trauma, may feel ashamed of their erotic desires, may find it difficult even to identify what it is that they enjoy or otherwise value in a sexual interaction, or may be unable to communicate effectively with their partner(s) about their preferences, even if these are known. For some such people, the use of explicit, documentary approaches can plausibly help them put their subjective feelings into words—whether by use of an app or by some other means—and this could prove helpful in many cases (see, e.g., Kleinplatz 2017).³⁴

³³ Such as one of the reviewers on this paper.

³⁴ More generally, as an anonymous reviewer kindly pointed out, several branches of the research and therapeutic literature on sex and relationships are explicitly premised on tracking and quantifying relationship data. The pioneering studies of Masters and Johnson, and of Kinsey, take this form. Additionally, the Gottman Institute’s popular methods for predicting and maintaining relationship stability rely on quantified algorithms (for information see: <http://www.gottman.com>). These points suggest not only potentially useful collaborations for

Furthermore, even if the very idea of metricizing seems inappropriate and distracting to most people, it may not be inappropriate and distracting to all. Human sexual proclivities are hugely variable (Gupta 2012), and the need to respect people's autonomy, agency, and consent should be kept in mind. People get their kicks, so to speak, in different, often bizarre-seeming (to others) ways. Given this variability, and to return to our initial example, it is possible that there are some people who genuinely enjoy sex that involves lots of thrusting and moaning, and who would further enjoy tracking their progress along those dimensions. In such cases, apps that measure thrusting, moaning, and other related variables might indeed track the partners' occurrent subjective pleasure-states quite well – and it could be beneficial for them to have apps like *SexKeeper* or *Spreadsheets* made available.

These observations do not just apply to sex-tracking apps. They also apply to other relationship quantification services. Gift-giving and chore-performance, for example, may seem irrelevant or misleading for some couples, but they may be valuable and important to others. It is important not to assume that all seemingly distracting metrics are inappropriate in all contexts. It is also important not to assume that the information generated by such metrics could never be used in beneficial ways by the people who take them seriously.

This brings us to our final, and perhaps most important, observation. We think that the *measurement-management* problem is only likely to be severe when romantic partners adopt a thoughtless attitude toward the use of QR

developers of QR apps, but they also highlight that quantification and metricization are not by their very nature anathema to well-functioning relationships.

technologies. If the partners naively assume that the app is a panacea—that giving more gifts (and the like) is all it takes to improve their relationship—there may well be a serious issue. We should certainly guard against thoughtlessness of this sort. But it is reasonable to think that this can be done. In the following sections, we discuss some examples of how partners can adopt—and have adopted—seemingly extreme tracking and gamification techniques to apparently good effect. Moreover, app-makers could, themselves, in principle address this problem through better design of the technology. Indeed, they may even have a special obligation in this respect to include reminders and prompts in their services that encourage users not to take an overly-narrow view of what matters in their relationships.

4.3 – Evaluating the Informal-Reciprocation Objection

This objection takes a particular stance on what matters within a relationship – informal reciprocation not formal exchange – and so it forces us to think more carefully about the virtues of a good relationship, and to confront the reality of the ‘no one size fits all’ problem.

The concern here is both expressive and psychological. It holds that people who track and gamify what they and their intimate partners are doing will *express* the wrong attitude about their affection/love for their partners and will *alter their actual attitudes* toward their partners in a problematic way. Specifically, they will signal that their interactions with their partners are akin to cold, commodified economic exchanges, suggesting that their partners matter

only insofar as they do something for them in return. This expression will affect their psychology as they start adopting a conditional, potentially resentful, attitude toward their partners: Why should I do anything for you when you have done so little for me? Consistent with this view, Clark and Waddell (1985) provided evidence that exchange-based relationships can foster perceptions of being exploited.

We think that the expressive and attitudinal concerns just outlined are worth taking seriously. However, there are additional considerations that need to be taken into account before one can assess the full strength of this objection.

First, the expressive meaning of any behavior or gesture within a relationship is highly variable and contingent. It is well-known that intimate partners can construct their own, private, symbolic languages: gestures or utterances that mean one thing to the world at large can mean something entirely different to the partners. Further, it is a mistake to treat the meaning that attaches to a gesture or behavior as fixed in any ethical analysis. Symbolic meanings can, do, and should be changed if other ethical considerations override their value. Brennan and Jaworski (2015) highlight this error in the case of objections to monetary market-based exchanges: money may signal detachment and lack of affection in Western cultures but it can signal affection and attachment in other cultures. What matters is whether the positive consequences of shifting to a new symbolic practice outweigh the negative consequences that attach to the existing symbolic meaning of that practice. Take kidney donation as a further example. People might not like the expressive

meaning that attaches to paid kidney donations, but if paying for kidney donations significantly improves outcomes for sufferers of kidney disease, then perhaps we should try to change the meaning that attaches to payment rather than simply treat it as a given.³⁵ The same reasoning could be said to apply in the case of relationship tracking and gamification. Perhaps such behaviors do have a negative symbolic meaning, on balance, currently, but if the practice has significant beneficial consequences, and if the negative meaning can be changed—at least within the context of a particular relationship—then perhaps it should be changed.³⁶

Second, there are reasons to think that informal reciprocation is not always the best model for a relationship, and could often be improved by moving to more formalized systems of exchange. Informal reciprocation can benefit the more powerful partner (often male) and can be used to perpetuate unjust gender inequalities within relationships. Intimate relationships are not just about sex and passion; they are also, typically, about sharing resources and time in the pursuit of common goals (child-rearing; career aspirations; leisure pursuits). The problem is that resources are not always equitably shared between the partners. A common feminist critique, for example, is that even though women are now ‘free’ to have their own careers, they still end up doing most of the housework and most of the carework (see, e.g., Gordon 2014). This is one highly problematic

³⁵ There could of course be other negative consequences associated with commodification, or other background ethical issues that need to be factored into the analysis (e.g., perhaps changing the stigma against selling kidneys will pressure or coerce people into giving up their kidneys; but see Semrau 2015). We have no stake in the kidney donation debate and the existence of such negative consequences doesn’t refute the basic point we are trying to make, namely: if the beneficial consequences of a practice are sufficiently great, it may warrant attempts to change the negative meanings that are presently associated with it.

³⁶ This should not be taken to imply that consequences are all that matter in relationships. Other non-consequentialist duties could still apply. The point we are making here only has to do with the impact of consequences on how we should approach the meaning of particular behaviors or practices within a relationship.

feature of the relationship status quo. If behaviors within a relationship have not been tracked and quantified, it is all too easy for this situation to persist. By introducing some formal tracking and quantification, one can potentially enable greater equity and accountability.

Third, this isn't only true in principle: there is some evidence to suggest that couples can make formal exchange-based models work for them. A fascinating example of this dynamic is the relationship between Bethany Soule and Daniel Reeves, co-creators of an app known as *Beeminder*. Soule and Reeves adopt an explicitly formal and commodified approach to the sharing of time and resources within their relationship. Whenever a chore needs to be done, they submit bids for the chore (how much they would need to be paid to do it) and whoever submits the lowest bid gets paid that amount to do it. Their approach has been profiled (Popken 2014) and Soule has written an article outlining how it works in practice (Soule 2013). What is clear from these discussions is that this formal model allows for greater accountability and fairness, at least for this couple, as judged by their own lights. Neither partner feels they are being unfairly treated, so there is less simmering resentment building up in the background. They are also clear that they don't quantify and commodify everything they do. They allow for some spontaneity and informality, to the degree and in the manner that suits their preferences. In this, they epitomize the thoughtful approach to the QR that we believe justifies a stance of cautious openness.³⁷

³⁷ Some might say we are dooming ourselves with this example. Soule and Reeves could break up in the future. Their relationship may not work out. But we think this concern is misplaced. Relationships should not be measured solely in terms of their duration; some relationships ought

4.4 – Evaluating the Mutual Trust Objection

A similar analysis applies to the mutual trust objection. But what exactly does mutual trust entail? Although the concept is often associated with sexual fidelity, we take it to be a broader issue than that. One reason for this broader interpretation is that not every successful relationship is characterized by sexual exclusivity and fidelity (Rubert & Bogaert 2015). So we assume that, in a wider sense, mutual trust involves something like ‘belief that your partner’s behavior is consistent with your mutually agreed-upon commitments and considered preferences and interests, in the absence of unjustified suspicion, and without the need for confirmatory evidence’. Understood this way, mutual trust seems like a fine idea – in theory. Some partnerships and personalities may be well disposed toward mutual trust. But practice is a different matter. The relationship status quo is not always conducive to mutual trust. People are often rightly or wrongly suspicious of their partners. Relationships can be beset by petty jealousies and paranoia. Even if mutual trust is an ideal, it is an ideal that many fall short of in reality.

In *some* cases, intimate surveillance could help to address part of this problem. Partners could, for example, in a gesture of good faith and commitment, voluntarily open themselves up to certain kinds or degrees of surveillance in order to assuage one another’s doubts. This would have to be done carefully and with due respect for autonomy, agency, and consent but note how transparency

to end; and the fact that given relationship does in fact end (or significantly changes its form or character) does not mean that the relationship was a failure. For our purposes, what matters is that this approach works for Soule and Reeves in the here and now.

and accountability of this sort is demanded and expected in many other contexts (e.g. political and commercial). Allowing similar degrees of transparency and accountability in intimate relationships does not seem to be so obviously corrosive of core relationship virtues that the idea should not be entertained.

There are significant risks that need to be factored into this analysis. Some relationships involve abusive and domineering personalities. Individuals with such personalities may force their partners to submit to surveillance or they may covertly utilize surveillance apps like *Flexispy*. This cannot be ethically justified. But even granting this, there is a further question to consider, which is whether the risk of such abuses is sufficient to warrant a preemptive ban or blanket disapproval of intimate surveillance. As two of us have noted previously, even when a given technology does have problematic properties or is ripe for abuse, there is a range of possible responses – from total prohibition of the technology, to its regulation, to total freedom in its development and retail – that must be considered, taking the balance of considerations into account (e.g., Danaher, Earp, and Sandberg 2017).

In keeping with this analysis, we suggest that a three-part stance is warranted. First, there is very little justification for covert spying apps that can be uploaded to a partner's phone without their knowledge and consent. If it is possible to ban or otherwise prevent the development these apps, this should be done. Second, despite this, we think there could be some justification for surveillance apps that require consent but involve a hard-but-reversible lock in (i.e., surveillance apps that function somewhat like commitment contracts). An

example might be an app that allows surveillance for a period of time (a day, a week, etc.) or that can only be reversed by resorting to a third party, or that requires some penalty to be paid if one wishes to opt out. It would be worth exploring whether some partners could, through mutual consent, use such services to good effect. Third, the remaining risks of abuse arising from these surveillance devices should be addressed through other avenues, *i.e.* more support for victims of domestic abuse and violence and better investigation and prosecution of such abuses.

In short, one should be slow to assume that all successful relationships are best characterized by a particular notion of mutual trust. Mutual trust is an ideal that many fall short of in reality. Intimate surveillance, properly agreed to by partners with equal bargaining power, could in some cases help close the gap between principle and practice.

4.5 Evaluating the Instrumental-Intrinsic Value Objection

This objection states that relationship-tracking ignores or undermines the intrinsic values associated with good relationships by focusing on quantifiable, instrumental benefits, in particular health benefits.

The concern here seems to be about changing attitudes and beliefs, not about changing loci of value. Relationships probably are both intrinsically and instrumentally valuable. QR technologies do not change this. All they change is how we perceive and prioritize the intrinsic and instrumental values that attach

to relationships. So, instead of caring about sexual activity for its intrinsic pleasure, or about another person as an end in themselves, one starts caring about them for reasons associated with (say) one's health and well-being. This is problematic only insofar as this shifting focus ends up missing what is really important about the practice or attitude in question.

How does this observation apply to QR technologies? In one respect, it is too early to say. We do not have sufficient empirical evidence on how the use of these technologies changes peoples' attitudes or behavior. Nevertheless, there is something to worry about. Many of the apps discussed above do seem to highlight and emphasize the instrumental benefits of sex and romance. Why do you need to know about heart rate and calories burned during sexual activity? If the value of sexual activity lies primarily in the occurrent subjective experiences of those involved, and shared intimacy and closeness between the lovers, this information about physiological measures and additional health benefits would seem to distract from what is truly important.

There is an interesting question to be asked about why the apps and technologies tout such instrumental health-related benefits. It could be that they are simply tapping into (and perhaps reinforcing) a general cultural obsession with personal health and fitness. It may be that doing so makes the apps more attractive and more likely to get attention in a highly competitive market (the health and fitness sections of the iOS and Android app stores are among the most popular). Insofar as this focus on health benefits is indeed problematic, it is something that probably should be downplayed. The metrics and gamification

tactics employed by the apps could, and probably should, focus more on the intrinsic values associated with relationships. Again, *Nipple's* subjective rating system would seem to point the way toward alternative metrics that get us closer to what is widely held to matter.

All of that said, it is important to emphasize that intrinsic and instrumental values can live side by side in intimate relationships. It would be foolish to adopt a staunchly intrinsic approach to the value of a relationship that refuses to recognize any additional extrinsic benefits. It is already well-established that intimate or romantic relationships have many instrumental benefits, ranging from the financial benefits that are often associated with being in certain legally recognized forms of relationship, to clear advantages to physical health, longevity, and well-being when the relationship is functioning well (Wudarczyk et al. 2013). We should not assume that there is a mutually exclusive choice here. It is quite possible to have a complex and multi-faceted attitude toward our intimate relationships, whereby we value them both intrinsically and instrumentally (see Earp et al. 2016). Moreover, if monitoring the instrumental benefits starts to interfere with maintaining the aspects of these relationships that we value intrinsically, we could take notice of this, and change the ways in which we relate to the extrinsic effects of our relationships.

A related worry is that gamification of relationships could encourage a mind-set whereby people start caring about 'winning' the relationship 'game' rather than about the goods specifically related to their actual relationship.³⁸

³⁸ We thank one of our anonymous reviewers for raising this concern.

Thus, the apps do not simply change how we perceive the balance of intrinsic and instrumental values that attach to our relationships; they create a new locus of value (the relationship game) that dominates our attention. This worry certainly merits consideration. However, pending further research, we think that it is fair to assume that a majority of users of QR technologies would not so easily enter into such a mind-set (i.e., a mindset according to which winning an app-based game would become the only, or even primary, end they would have with respect to their relationship). In other words, it is hard to believe that the game(s) could be so absorbing, and that people's concern for their relationships would be so tenuous, that this shift in ultimate ends would happen on a large scale. That said, we welcome and encourage empirical research into the issue.

4.6 – Evaluating the Gendered Relationship Objection

What of the claim that QR technologies are likely to reinforce problematic gender stereotypes and relationship roles? This is almost certainly going to happen. Harmful gender stereotypes and invidious biases are rife in society at large and it is not surprising, though it is no less regrettable, that this gets reflected in our technologies. We agree that this is a serious concern. But here, too, there are additional considerations that need to be taken into account before the full strength of the objection can be assessed, and before the proper response to it can be articulated.

First, as mentioned above, there are ways in which tracking and quantification could help reverse or reduce gender-based problems within some

relationships. Our earlier argument about the benefits of formal exchange for some partners over informal reciprocation provides one example of this; our upcoming argument about community-based initiatives using intimate tracking (see below) provides another.

Second, context matters, almost always more than sheer content, when it comes to the gender-related impact of any given app or service of this sort. This is something that has been widely discussed in relation to pornographic representations and their impact on women (Drabek 2016). In that debate, it is often argued that some pornographic material contains content that is *prima facie* inegalitarian or degrading (e.g., BDSM pornography) but that is often used and expressed in a context that mitigates or undermines any inegalitarian effects it may have. Thus context moderates the meaning and significance of the content. The same is likely to be true in the case of apps and services that feature content that is similarly *prima facie* objectionable: whether it is actually objectionable, or likely to have objectionable effects, will depend more on the general social context in which the apps are developed, as well as on the particulars of the relationships in which they are used.

The gender-based objection does, we believe, warrant a stance of constant vigilance towards apps and services of this sort. It is right and proper for people to call out app-makers for the problematic and gendered assumptions that underlie the services they provide. This will help to improve the social context in which apps of this sort are used and reproduced. A clear example of this happening has already been provided in the case of the period-tracking apps

that are targeted at heterosexual men and that perpetuate myths about the female menstrual cycle. These apps have been ridiculed and critiqued in public and often quickly removed from the leading app stores.

4.7 Evaluating the Neoliberalization Objection

This brings us to the last of the objections (recall that we are setting aside the ones about privacy). This objection calls attention to the tendency of tracking technologies to privatize, and make individuals responsible for, what are at base more structural social problems.

What might this mean in the context of a relationship? We recognize two interpretations: either it means that relationships are best when they come with the right social supports (tax benefits, childcare allowances, good community services and amenities, support from family and friends) and the QR technologies tend to shift the burden of responsibility onto the relationship partners and away from the providers of these social supports; or it means that QR technologies tend to re-privatize aspects of intimate relationships that some have sought to make more public, such as problems around intimate abuse and violence. How plausible are these concerns in the context of the present discussion?

In general, how plausible they are will depend on how much one buys into the broader neoliberal critique and its application to relationships. We tend to think that many of the behaviors addressed by QR technologies can plausibly

be construed as having a solution primarily at the individual level (e.g., being more caring toward one's partner). Furthermore, the neoliberal critique often assumes a false dichotomy. As others have recently argued (Madva 2016), it is too simple to think in terms of prioritizing the systemic over the individual or vice versa: instead, individual changes are often essential to successful systemic reform. As Kristina Gupta has stated:

Interventions aimed at the individual may be effective and may have reverberating effects on the broader social issues, and vice versa. [. . .] Combined with efforts to address the social factors that contribute to [problematic relationships or forms or states of love] and with measures in place to mitigate the normalizing potential of these interventions, [relationship] technologies may indeed increase human flourishing.
(2013, 19)

More importantly, it could be argued that the neoliberal critique misses what is most interesting and potentially disruptive, in the best sense, about QR technologies. Apps and devices aimed at improving intimate relationships through collective tracking, surveillance and gamification, actually highlight the social, community-oriented potential of these technologies. They show how this technology can be used to collect information that would otherwise be hidden, and to share that information between two or more people. This can, of course, impact individual behavior; but it can also impact collective, social behavior. It is consequently a mistake to assume that QR technologies necessarily have a private orientation. If one's concern is the lack of systemic supports for

relationship partners, or the re-privatization of public problems, then tracking and surveillance could be used to promote systemic solutions.

For example, it could document the struggle that relationship partners have in the absence of social and community support. It could shine light on often hidden problems of domestic abuse and violence. Such community-oriented projects are already being undertaken concerning other issues, using self-tracking and surveillance technologies. For instance, there are noteworthy social movements that use such technologies to contribute to community knowledge (the citizen science movement) and to community-based activism (the citizen-sensing movement) (Lupton 2016). Some of the most prominent examples of activism in this vein focus on recording environmental pollution and facilitating responses to the associated harms.³⁹ Perhaps a similar approach, broadly construed, could be taken with respect to relationships using QR technologies.

Of course, we have to be realistic. Many of the apps and technologies described earlier are made for commercial purposes. They only survive and thrive if they become commercially viable. This is a consequence of how these services get funded and created in the present era. As long as this funding process continues, it is likely that they will prop up and reinforce the dominant economic and other ideologies of our time. But we think this should be seen as an opportunity rather than a fatal problem. It highlights the great potential for Open Source, social, or academically funded QR technologies. These approaches

³⁹ See, for example, <https://citizensense.net>

could redirect these technologies away from private, commercial uses to more positive social uses.

5. Conclusion and Next Steps

Where do we go from here? Our own view is that the Quantified Relationship is a fascinating emerging phenomenon worthy of closer scrutiny. To date, the literature has done a good job at identifying some of the main concerns one could have about this phenomenon. But this is not enough. We need to move beyond cataloguing concerns to the careful assessment of their merits. How seriously should we take them? When might it be a good idea to use QR technologies, and when might it be a bad idea? We have tried to take the first step in this direction with our evaluation of the objections raised thus far.

Our position is that there is no blanket objection to, nor knockdown argument against, the use of QR technologies. Instead, the objections that have been raised can be seen as identifying a set of guidelines to follow or cautions to be mindful of when using such technologies in intimate relationships. The lessons learned from these objections can help us to stay on the right ethical track, and may generate useful fodder for policy discussions concerning possible prohibition or regulation (where necessary), as well as for wider conversations in society about what makes a for a good relationship, and how to achieve that (see Earp & Savulescu in press).

There are gaps in what we have argued: our discussion, despite its length, has in no way been comprehensive. This shows how complex the matters we

have explored truly are. We have simply sought to push back against the prevailing skeptical evaluations of QR technologies that have so far been raised in the literature, toward a more fruitful dialectic. We welcome the efforts of others to respond in kind, and to highlight any weaknesses they see in our appraisals or additional objections that we may have missed. We also call for greater empirical investigation of the effects of these technologies on our attitudes to others and on the utility of these technologies in changing behavior. In this respect, we think there are great opportunities in the development of QR technologies that have yet to be fully exploited.

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