Designing to Minimise Rather than Maximise Dependence on Behaviour Change Technologies

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Abstract

The rapidly expanding collection of behaviour change technologies (BCTs) across health, education, and productivity domains has normalised design approaches that rely on sustained user engagement, encouraging further technological dependence rather than user empowerment. Current approaches typically aim to maximise certain engagement metrics, rather than supporting users in developing capacities to sustain target behaviours after the intervention ends. This paper builds upon previous work establishing a Self-Determination Theory-informed approach for self-sustained regulation, to explore broader ethical implications of BCT design paradigms relying on extrinsic motivational scaffolds. It examines some problematic assumptions that common design patterns reflect: treating users as helpless subjects to steer, rather than agents with complex needs and capacities for self-determination. Through a critical examination of BCT design patterns and theoretical foundations, this paper calls for a reorientation of design goals toward minimising technological dependence, supported by broader cultural shifts in how we think about and measure success in behavioural design.

Keywords

behaviour change, self-determination, empowerment, technological dependence

1. Introduction

Recent years have seen a proliferation of mobile applications, browser extensions, and wearable devices designed to help people make positive behavioural changes. These behaviour change technologies (BCTs) leverage various design features and incentive mechanisms – from reminders and performance tracking to streaks and leader boards – to motivate and otherwise support users in adopting or avoiding certain behaviours. Despite their popularity, BCTs often struggle to maintain user interest and engagement, with many abandoned within weeks of adoption [1, 2]. As these interventions are typically designed to scaffold behaviour change *through* the platform (where effectiveness depends on sustained use), abandoning the technology often means likewise abandoning any positive behavioural changes.

This position paper critically discusses a predominant *behaviourist* bias in current BCT design trends whereby behaviour change depends on the external regulation of the intervention, rather than supporting people's cognitive capacities for autonomous, self-determined behavioural regulation from within. Inspired by ideas in Self-Determination Theory (SDT) [3, 4], a social-cognitive alternative to behaviourism, human-computer interaction (HCI) researchers are gaining interest in exploring how designers may support users' *intrinsic* motivation *to use BCTs* [5, 6, 7, 8, 9, 10]: encouraging sustained use and, thereby, sustained performance of target behaviours. However, contrary to this more popular approach, the author previously argued that the key objective should not be to maximise BCT use, focusing on the technology (and needs of designers), but rather to teach useful habits, skills and attitudes that enable users to eventually independently sustain positive behavioural changes after the intervention ends [11]. Based on a systematic review of current work, we proposed that Organismic Integration Theory (OIT), a specific mini-theory of SDT, may offer promising research directions for future BCT design towards this aim.

HHAI-WS 2025: Workshops at the Fourth International Conference on Hybrid Human-Artificial Intelligence (HHAI), June 9–13, 2025, Pisa, Italy

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This paper extends this foundation by critiquing approaches in the current BCT design paradigm on more foundational grounds, moving beyond specific design tweaks to broader cultural shifts in the kinds of relationships with technology we as designers encourage. It identifies common BCT design patterns that may undermine users' empowerment and flourishing, including (a) encouraging technological dependence; (b) prioritising engagement metrics above contextual/holistic user needs; and (c) neglecting the development of users' capacity for sustainable self-regulation. Beyond practical considerations of long-term effectiveness, this paper goes deeper into the ethical dimensions of how users are treated and the kinds of treatment they deserve, and how this may impact their self-perception and self-sufficiency over time. It proposes a redefinition of typical BCT design goals – from maximising app engagement to supporting the development of capacities that enable users to sustain positive behaviours autonomously and voluntarily, and in ways that may better contribute to their overall flourishing.

2. Problematic Assumptions in Current BCT Design

Behaviourism is a popular psychological paradigm characterised by its focus on observable behaviours and correlations. It developed from various studies of how external stimuli influence human behaviour, with the deliberate exclusion of appeals to subjective cognitive or affective states [12, 13]. Despite the growing popularity of cognitive approaches in behavioural psychology [14, 15, 16, 16, 3], behaviourist principles remain prevalent in many interaction design practices, where designers (and algorithms) measure correlations between user behavioural patterns and interface elements (e.g. through A/B testing [17]), giving them insights on how to effectively manipulate design features to optimise specific behavioural metrics. Similar principles carry over to BCT design, manifesting in trends such as:

- **Engagement-centric metrics**. BCTs prioritise quantifiable behavioural metrics (steps taken, tasks completed, minutes practised, etc.) over qualitative aspects of user experience, focusing on what they can *get users to do* rather than *how they affect* users' attitudes, experiences, and overall wellbeing over time. These metrics are also typically rather narrow in that they are limited to the sorts of data these devices are able to measure, overlooking more qualitative insights on holistic or secondary effects on the person's life and other goals, responsibilities and needs outside of the technology's scope – which may even conflict with its ideas of success [18].
- **External incentive mechanisms**. Current BCTs commonly employ external rewards or punishments, such as badges, streaks, leader boards [19, 20] to influence user behaviour. BCTs may even deliberately utilise emotionally manipulative tactics in their notifications, such as blaming disengaged users for being "lazy" or unmotivated, or even personally offending virtual agents, weaponising guilt to drive compliance [21].

The theoretical framework provided by SDT helps to highlight what may make some of these design patterns counterproductive, if not problematic. It distinguishes between different types of motivation, with intrinsic and internalised forms demonstrating superior outcomes compared to extrinsically-motivated behavioural regulation [3, 22, 23], especially in the long term. When *intrinsically* motivated, individuals engage in behaviours because they find them inherently enjoyable or satisfying, while *integrated* motivation occurs when people have assimilated a behaviour's value such that they find doing the behaviour personally meaningful or useful (even if it is not necessarily fun in itself). These autonomous forms of motivation typically lead to greater persistence and higher quality motivation and performance than more extrinsically-controlled types, which typically results in minimal effort and quicker abandonment [4, 24, 3]. While the SDT mini-theory Cognitive Evaluation Theory (CET) explains conditions for fostering intrinsic enjoyment (of the BCT), which HCI researchers currently favour,[1] we argued that OIT provides a more empowering framework to help users integrate motivation for a personally important (but not necessarily 'fun') behaviour in ways that can be sustained beyond intervention use [11]. In the former case, designers may use a variety of features to make the BCT more

[1]Out of the 15 HCI papers we reviewed that employ SDT towards supporting behaviour change, 11 relied on encouraging intrinsic motivation for app use rather than internalising motivation for the behaviour itself [11].

intrinsically enjoyable to use, like digital rewards, competitive/cooperative elements, engaging virtual agents, or words of encouragement. Hence, even if the support offered remains external, the motivation to use the technology becomes more volitional. In the latter case, the aim is not so much transforming the BCT into an enjoyable medium for performing the behaviour, but into a tool for teaching people useful ways to think about and approach the behavioural target, reflecting on its ultimate personal value such that they become intrinsically motivated to make enduring changes in their lifestyles to incorporate it.[2] In either case, the theoretical lens of SDT helps to highlight a fundamental contradiction as BCTs attempt to foster enduring behavioural changes while employing mechanisms that systematically undermine the development of sustainable self-determined motivation. This misalignment between BCTs' stated aims and theoretical foundations poses a critical design opportunity, offering not only practical but ethical advantages. The next section unpacks some of these ethical dimensions that may further encourage a shift towards minimising BCT dependence.

3. Ethical Dimensions of BCT Design Patterns

3.1. From Passive Subjects to Active Participants

When BCTs employ operant conditioning mechanisms like extrinsic rewards and punishments, the technology is positioned as regulatory authority, while users are relegated to passive subjects responding to stimuli. Even if effective, this neglects people's capacities for reflection, meaning-making, and volitional choice in their behaviour change processes, offering them no means to negotiate or balance the objectives of the technology with their unique combination of needs and constraints. Instead, SDT emphasises the critical importance of supporting people's agency, treating them as worthy and capable of acquiring the necessary skills and capacities for autonomous self-regulation. This perspective aligns with philosophical traditions emphasising respect for persons and their autonomy [25, 26], an idea that has started gaining traction in HCI and technoethics [27, 28, 29], and is already well established in 'person-centred' principles in health/care domains [30, 31, 32, 33, 34, 35]. Following this principle, users should not be treated as subjects or patients but as active collaborators: BCTs should afford meaningful opportunities for them to reflect on their personal goals and values, understand the rationales behind recommendations and suggestions, and exercise choice in how/when they implement desired behavioural changes [18].

3.2. From Short-Term Compliance to Enduring Empowerment

While digital incentive mechanisms may be effective in motivating behavioural compliance in the short term, they offer limited support for behaviour internalisation. Beyond encouraging technological dependence, simply enhancing user experience with design elements like gamification offers no support for users to sustain motivation if they stop using the BCT for whatever reason (e.g. if the novelty effect wears off, if the BCT's affordances no longer suit their daily routines, etc.). This may be combated if BCTs instead prioritise teaching transferable skills and knowledge that users can apply independently of the technology, including self-monitoring techniques, environmental restructuring strategies, and external resource suggestions, progressing towards more light-touch support as users' skills, knowledge and self-sufficiency with regard to the behaviour increase. Contrary to typical BCT success metrics, taking this perspective, decreased engagement with the BCT might actually indicate success if it reflects users' increasing capacity for autonomous self-regulation, where the converse might indicate problematic dependence. An approach centred on user empowerment should evaluate success not (only) by how frequently users engage with the technology, but by how effectively it supports the development of generalisable skills, competencies, and healthy attitudes regarding the target behaviour. As our previous work argued [11], SDT offers a useful framework for describing how environmental

[2]For instance, rather than simply gamifying the process of learning a language to make the app enjoyable (e.g. "levelling up" and receiving gold stars), the app may progressively recommend films, books, or communities suited to enhance their experience and support their learning, whilst helping them integrate the target behaviour into broader lifestyle changes.

scaffolding can support people in this regulation integration process, as well as evaluation metrics (e.g. basic psychological needs satisfaction [36]) – including adaptions for HCI contexts [37]. This may be enhanced by other measures of autonomy and self-integration (e.g. the *Autonomy Scale Amsterdam* [38]), and contextual considerations (e.g. linguistic and cultural-contextual effects [39]).

3.3. From Narrow Outcomes to Personal Flourishing

Another ethical dimension concerns supporting a person's holistic needs and constraints versus the isolation of specific behavioural metrics. BCTs typically target discrete behavioural domains without sufficient consideration of how these domains interact within users' broader lives and value systems as a whole and unique individual. This isolation of behaviours may implicitly enforce what Spiel et al. [18] describe as a "normative ontology" that imposes narrow conceptions of success and wellbeing. For instance, fitness apps relying on step-counts implicitly define health primarily in terms of maximising (a specific form of) physical movement, potentially neglecting other dimensions of health, and failing to accommodate legitimate constraints that might make high step counts impossible or undesirable for certain individuals in certain contexts. This shift relates to the 'respect' principle from above in that it involves treating the user as a *whole person*: acknowledging the multiple, sometimes competing values and commitments that shape their lives, rather than reducing them to a generic condition or specific behavioural requirement [29]. Such narrow success metrics may, ironically, undermine rather than support personal flourishing if they discourage users from sustaining a healthy balance between them. This form of respecting the user requires adapting to differences in individual circumstances, interests, and values without 'guilt-tripping' or shaming them for diverging goals.

4. Challenges and Future Directions

Despite its potential benefits, implementing such empowerment-directed approaches in BCTs faces several challenges. First, commercial realities often conflict with ethical ideals, as business models typically depend on maximising user engagement rather than fostering independence. Addressing this challenge requires exploration of alternative business models that align commercial interests with genuine user empowerment. These might involve privileging paid subscription models (rather than frequency-driven ad-based models) that explicitly include "graduation" phases, or models where intensive support gradually transitions to helpful resources and suggestions that users can continue to access as needed, enhancing the process without them necessarily depending on the BCT for motivation or performing the target behaviour at all.

Another challenge concerns the development and validation of metrics to evaluate a BCTs' success in supporting users' development of autonomous motivation and self-regulatory capacities. More than assessing short-term behavioural outcomes, future research should explore mixed-methods evaluation approaches that can capture both quantitative indicators of autonomous motivation and qualitative dimensions of users' progress and experiences. These approaches should consider longer-term behavioural trajectories, with particular attention to users' capacity for sustaining positive behaviours after technological supports are reduced or removed. Qualitative approaches are typically much more resource-intensive to gather and process than qualitative results of engagement patterns, constituting a clear disadvantage. However, large language models (LLMs) offer new opportunities for qualitative, open-ended user experience elicitation at scale (e.g. contextual AI journaling) [40], including data processing (e.g. through thematic analysis) and the construction of comprehensive personalised recommendations. LLMs may also allow for more nuanced forms of support tailored to complex individual needs, perhaps in the form of agentic AI assistants [41, 42] that integrate and distribute multi-goal directed behavioural scaffolding across users' digital ecosystem (smart calendars, curated support across platforms, etc.), rather than limiting support to the intentional use of specific applications.

Finally, a key challenge is learning how to balance autonomy support with effective scaffolding – providing structure without undermining users' agency and ability to negotiate with/diverge from the user assumptions and goals embedded in the system. This involves investigating which approaches

are most suitable for various stages of the internalisation process, how individual differences affect responses to support types, and how to offer support in ways that are ethical and appropriate for different domains and cultural contexts.

5. Conclusion

The dominant paradigm in BCT design supports behaviour change through various digital incentive mechanisms and extrinsic motivational scaffolds. One popular tactic is to make BCT use more enjoyable through incorporating elements of gamification, thus encouraging voluntary performance of target behaviours. Drawing from SDT, this paper sketches an alternative vision focused on facilitating users' progressive internalisation of motivation for *target behaviours*, rather than the *BCT* itself, leveraging technology not as a permanent crutch but as a guide toward greater self-determination. This shift entails not merely technical adjustments but a fundamental reorientation of design goals and success metrics. More than practical benefits, this offers ethical advantages, as users are treated more as agents with unique and complex needs, capabilities and constraints, rather than subjects to steer or narrow metrics to optimise. This position paper discusses how SDT frameworks may help to inform this change, specifically the mini-theory of OIT, as well as important implementational challenges. By prioritising meaningful user understanding and empowerment, BCT design may align more closely with the ultimate goal of promoting sustainable behaviour change and individual flourishing.

Declaration on Generative AI

The author(s) have not employed any Generative AI tools.

References

[1] A. S. Mustafa, N. Ali, J. S. Dhillon, G. Alkawsi, Y. Baashar, User engagement and abandonment of mhealth: a cross-sectional survey, Healthcare 10 (2022) 221.

[2] D. Harrison, P. Marshall, N. Bianchi-Berthouze, J. Bird, Activity tracking: barriers, workarounds and customisation, in: Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing, UbiComp '15, Association for Computing Machinery, New York, NY, USA, 2015, p. 617–621. URL: https://doi.org/10.1145/2750858.2805832. doi:10.1145/2750858.2805832.

[3] R. M. Ryan, E. L. Deci, Self-determination theory: Basic psychological needs in motivation, development, and wellness, The Guilford Press, 2017. URL: https://doi.org/10.1521/978.14625/28806.

[4] R. M. Ryan, E. L. Deci, Intrinsic and extrinsic motivations: Classic definitions and new directions, Contemporary educational psychology 25 (2000) 54–67.

[5] M. Aufheimer, K. Gerling, T. N. Graham, M. Naaris, M. J. Konings, E. Monbaliu, H. Hallez, E. Ortibus, An examination of motivation in physical therapy through the lens of self-determination theory: Implications for game design, in: Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems, CHI '23, Association for Computing Machinery, New York, NY, USA, 2023. URL: https://doi.org/10.1145/3544548.3581171. doi:10.1145/3544548.3581171.

[6] V. R. Lerch, S. T. Steinemann, K. Opwis, Understanding fitness app usage over time: Moving beyond the need for competence, in: Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems, CHI EA '18, Association for Computing Machinery, New York, NY, USA, 2018, p. 1–6. URL: https://doi.org/10.1145/3170427.3188608. doi:10.1145/3170427.3188608.

[7] H. Saksono, C. Castaneda-Sceppa, J. Hoffman, V. Morris, M. Seif El-Nasr, A. G. Parker, Storywell: Designing for family fitness app motivation by using social rewards and reflection, in: Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, CHI '20, Association for Computing Machinery, New York, NY, USA, 2020, p. 1–13. URL: https://doi.org/10.1145/3313831.3376686. doi:10.1145/3313831.3376686.

[8] M. Ford, P. Wyeth, D. Johnson, Self-determination theory as applied to the design of a software learning system using whole-body controls, in: Proceedings of the 24th Australian Computer-Human Interaction Conference, OzCHI '12, Association for Computing Machinery, New York, NY, USA, 2012, p. 146–149. URL: https://doi.org/10.1145/2414536.2414562. doi:10.1145/2414536.2414562.

[9] M. Yang, K. Lee, E. Kim, Y. Song, S. Lee, J. Kang, J. Han, H. Song, T. Kim, Magic brush: An ai-based service for dementia prevention focused on intrinsic motivation, Proc. ACM Hum.-Comput. Interact. 6 (2022). URL: https://doi.org/10.1145/3555549. doi:10.1145/3555549.

[10] D. Sinai, R. B. Rosenberg-Kima, Perceptions of social robots as motivating learning companions for online learning, in: Proceedings of the 2022 ACM/IEEE International Conference on Human-Robot Interaction, HRI '22, IEEE Press, Sapporo, Hokkaido, Japan, 2022, p. 1045–1048.

[11] L. Alberts, U. Lyngs, K. Lukoff, Designing for sustained motivation: A review of self-determination theory in behaviour change technologies, Interacting with Computers (2024) iwae040. URL: https://doi.org/10.1093/iwc/iwae040. doi:10.1093/iwc/iwae040. arXiv:https://academic.oup.com/iwc/advance-article-pdf/doi/10.1093/iwc/iwae040/59180461/iwae040.pdf.

[12] B. Skinner, The behavior of organisms: an experimental analysis. (1938).

[13] G. Graham, Behaviorism, in: E. N. Z. . U. N. (eds.) (Ed.), The Stanford Encyclopedia of Philosophy (Spring 2023 Edition), https://plato.stanford.edu/archives/spr2023/entries/behaviorism/, 2000.

[14] J. S. Beck, Cognitive behavior therapy: Basics and beyond, Guilford Publications, 2020.

[15] A. Bandura, et al., Social foundations of thought and action, Englewood Cliffs, NJ 1986 (1986) 2.

[16] J. O. Prochaska, W. F. Velicer, The transtheoretical model of health behavior change, American journal of health promotion 12 (1997) 38–48.

[17] O. Jeunen, A. Ustimenko, Learning metrics that maximise power for accelerated a/b-tests, in: Proceedings of the 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, KDD '24, Association for Computing Machinery, New York, NY, USA, 2024, p. 5183–5193. URL: https://doi.org/10.1145/3637528.3671512. doi:10.1145/3637528.3671512.

[18] K. Spiel, F. Kayali, L. Horvath, M. Penkler, S. Harrer, M. Sicart, J. Hammer, Fitter, happier, more productive? the normative ontology of fitness trackers, in: Extended Abstracts of the 2018 CHI Conference on Human Factors in Computing Systems, CHI EA '18, Association for Computing Machinery, New York, NY, USA, 2018, p. 1–10. URL: https://doi.org/10.1145/3170427.3188401. doi:10.1145/3170427.3188401.

[19] A. Neupane, D. Hansen, A. Sharma, J. A. Fails, B. Neupane, J. Beutler, A review of gamified fitness tracker apps and future directions, in: Proceedings of the Annual Symposium on Computer-Human Interaction in Play, CHI PLAY '20, Association for Computing Machinery, New York, NY, USA, 2020, p. 522–533. URL: https://doi.org/10.1145/3410404.3414258. doi:10.1145/3410404.3414258.

[20] L. Lehtonen, M. D. Kaos, R. Kajastila, L. Holsti, J. Karsisto, S. Pekkola, J. Vähämäki, L. Vapaakallio, P. Hämäläinen, Movement empowerment in a multiplayer mixed-reality trampoline game, in: Proceedings of the Annual Symposium on Computer-Human Interaction in Play, CHI PLAY '19, Association for Computing Machinery, New York, NY, USA, 2019, p. 19–29. URL: https://doi.org/10.1145/3311350.3347181. doi:10.1145/3311350.3347181.

[21] L. Alberts, U. Lyngs, M. Van Kleek, Computers as bad social actors: Dark patterns and anti-patterns in interfaces that act socially, 2024. arXiv:2302.04720.

[22] N. Ntoumanis, J. Y. Ng, A. Prestwich, E. Quested, J. E. Hancox, C. Thøgersen-Ntoumani, E. L. Deci, R. M. Ryan, C. Lonsdale, G. C. Williams, A meta-analysis of self-determination theory-informed intervention studies in the health domain: Effects on motivation, health behavior, physical, and psychological health, Health psychology review 15 (2021) 214–244.

[23] F. Gillison, P. Rouse, M. Standage, S. J. Sebire, R. M. Ryan, A meta-analysis of techniques to promote motivation for health behaviour change from a self-determination theory perspective, Health Psychology Review 13 (2019) 110–130. doi:10.1080/17437199.2018.1534071.

[24] R. M. Ryan, E. L. Deci, Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being., American psychologist 55 (2000) 68.

[25] I. Kant, Groundwork of the metaphysics of morals, Cambridge University Press, Cambridge, UK, 1785/2012.
[26] S. Kerstein, Treating Persons as Means, in: E. N. Zalta (Ed.), The Stanford Encyclopedia of Philosophy, Summer 2019 ed., Metaphysics Research Lab, Stanford University, 2019.
[27] M. Van Kleek, W. Seymour, R. Binns, N. Shadbolt, Respectful things: adding social intelligence to 'smart' devices, in: Living in the Internet of Things: Cybersecurity of the IoT - 2018, Institution of Engineering and Technology, London, UK, 2018, pp. 6 (6 pp.)–6 (6 pp.). URL: https://digital-library.theiet.org/content/conferences/10.1049/cp.2018.0006. doi:10.1049/cp.2018.0006.
[28] W. Seymour, M. Van Kleek, R. Binns, D. Murray-Rust, Respect as a lens for the design of ai systems, in: Proceedings of the 2022 AAAI/ACM Conference on AI, Ethics, and Society, AIES '22, Association for Computing Machinery, New York, NY, USA, 2022, p. 641–652. URL: https://doi.org/10.1145/3514094.3534186. doi:10.1145/3514094.3534186.
[29] L. Alberts, G. Keeling, A. McCroskery, Should agentic conversational ai change how we think about ethics? characterising an interactional ethics centred on respect, 2024. URL: https://arxiv.org/abs/2401.09082. arXiv:2401.09082.
[30] C. R. Rogers, The necessary and sufficient conditions of therapeutic personality change., Journal of consulting psychology 21 (1957) 95.
[31] C. R. Rogers, The foundations of the person-centered approach, Education 100 (1979) 98–107.
[32] W. P.-C. Healthcare, A policy framework, Geneva, Switzerland: The World Health Organization (2007).
[33] J. Mezzich, J. Snaedal, C. van Weel, I. Heath, The international network for person-centered medicine: background and first steps, World Medical Journal 55 (2009) 104–107.
[34] D. Wanless, et al., Securing our future health: taking a long-term view (2002).
[35] P.-C. Training, S. C. o. P. P. Curriculum (PCTC) Scoping Group, Ethics, Person-centred care: Implications for training in psychiatry 2018 (college report cr215), 2018.
[36] B. Chen, M. Vansteenkiste, W. Beyers, L. Boone, E. L. Deci, J. V. der Kaap-Deeder, B. Duriez, W. Lens, L. Matos, A. Mouratidis, R. M. Ryan, K. M. Sheldon, B. Soenens, S. V. Petegem, J. Verstuyf, Basic psychological need satisfaction, need frustration, and need strength across four cultures, Motivation and Emotion 39 (2014) 216–236. URL: https://doi.org/10.1007/s11031-014-9450-1. doi:10.1007/s11031-014-9450-1.
[37] D. Peters, R. A. Calvo, R. M. Ryan, Designing for motivation, engagement and wellbeing in digital experience, Frontiers in psychology 9 (2018) 797. URL: http://dx.doi.org/10.3389/fpsyg.2018.00797. doi:10.3389/fpsyg.2018.00797.
[38] J. Bergamin, M. Hoven, R. J. van Holst, C. L. Bockting, D. Denys, B. Nevicka, J. Luigjes, Development and validation of the autonomy scale amsterdam, Comprehensive Psychiatry 131 (2024) 152466. URL: https://www.sciencedirect.com/science/article/pii/S0010440X24000178. doi:https://doi.org/10.1016/j.comppsych.2024.152466.
[39] J. Zycinska, M. Januszek, How to measure the self-determination continuum? initial validity evidence for the polish version of the global motivation scale (gms), Current Psychology 40 (2021) 2211–2220.
[40] S. Nepal, A. Pillai, W. Campbell, T. Massachi, E. S. Choi, X. Xu, J. Kuc, J. F. Huckins, J. Holden, C. Depp, N. Jacobson, M. P. Czerwinski, E. Granholm, A. Campbell, Contextual ai journaling: Integrating llm and time series behavioral sensing technology to promote self-reflection and well-being using the mindscape app, in: Extended Abstracts of the CHI Conference on Human Factors in Computing Systems, CHI EA '24, Association for Computing Machinery, New York, NY, USA, 2024. URL: https://doi.org/10.1145/3613905.3650767. doi:10.1145/3613905.3650767.
[41] I. Gabriel, A. Manzini, G. Keeling, L. A. Hendricks, V. Rieser, H. Iqbal, N. Tomašev, I. Ktena, Z. Kenton, M. . Rodriguez, J. Manyika, The ethics of advanced ai assistants, arXiv preprint arXiv:2404.16244 (2024).
[42] X. Liu, H. Yu, H. Zhang, Y. Xu, X. Lei, H. Lai, Y. Gu, H. Ding, K. Men, K. Yang, S. Zhang, X. Deng, A. Zeng, Z. Du, C. Zhang, S. Shen, T. Zhang, Y. Su, H. Sun, M. Huang, Y. Dong, J. Tang, Agentbench: Evaluating llms as agents, 2023. URL: http://arxiv.org/abs/2308.03688. doi:10.48550/arXiv.2308.

03688, arXiv:2308.03688 [cs].