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Mental and behavioural responses to Bahá'í fasting: Looking behind the scenes of a religiously motivated intermittent dry fast using a mixed methods approach

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Abstract

Background / Objective: Historically, fasting has not only been practiced for medical but also for religious reasons. Bahá'ís follow an annual religious fast of 19 days. We assessed motivation behind and subjective health impacts of Bahá'í fasting.

Methods: A convergent parallel mixed methods design was embedded in a clinical single arm observational study. Semi-structured interviews were conducted with six fasters before, during and after fasting. Three months after the fasting period, two focus group interviews were conducted. 146 Bahá'í volunteers answered an online survey at five time points before, during and after fasting.

Results: Interviews: Fasting was found to play a central role for the religiosity of interviewees, implying changes in daily structures, spending time alone, engaging in religious practices, and experiencing social belonging. Results show an increase in mindfulness and well-being, accompanied by behavioural changes and experiences of self-efficacy and inner freedom.

Survey: Scores point to an increase in mindfulness and well-being during fasting, while stress, anxiety and fatigue decreased. Mindfulness remained elevated even three months after the fast.

Conclusion: Bahá'í intermittent dry fast seems to enhance participants' mindfulness and well-being, lowering stress levels and reducing fatigue. Some of these effects lasted more than three months after fasting.

Keywords: intermittent food-restriction, mindfulness, self-efficacy, well-being, mixed methods, health behaviour, coping ability, religiously motivated fasting

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Short running head: A mixed methods approach to Bahá'í fasting

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Conflict of interest: No conflicts are declared by any of the authors. Daniela Koppold-Liebscher and Sarah Demmrich are registered members of the international Bahá'í community. Daniela Koppold-Liebscher has co-founded and teaches at the Academy of Integrative Fasting.

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Introduction

Intermittent fasting (IF) and time restricted eating (TRE) have gained increased awareness not only within the public community and media but also specifically within experimental and clinical research over the past decade [1]. Publications on IF and TRE mainly focus on anthropometric, physiological, biochemical, and immunological aspects of fasting [2-4]. In contrast, subjective experiences of fasting have received far less attention. This is surprising, as historically periods of fasting have been recommended in almost all major religions worldwide [5-7] (for examples please refer to Figure 1). Traditionally, religious fasting is not primarily seen as a specific dietary approach, but as a tool for strengthening one's will, getting closer to the divine, purifying one's thoughts and elevating one's consciousness [7, 8]. In the clinical setting, these subjective experiences and related values of fasting might significantly determine its effects and outcomes and thus merit attention.

In this study we approached fasting using individual qualitative and focus group interviews, combining them with quantitative questionnaire data to highlight subjective experiences associated with fasting through a multi-facetted approach. We chose a traditional religious fasting that is similar to the wide-spread fasting of Ramadan, yet allows for easier replicability in terms of seasonal and daily practice time-frames [5]. It also shares many characteristics with TRE, which has shown promising results regarding reduction of cardiovascular risk factors, obesity [9, 10] and inflammatory markers, positively influencing gut microbiota and psychological well-being [1, 11, 12].

The Bahá'í Fast (BF) can be regarded as a diurnal intermittent dry fast, where followers abstain from food and drink during daylight hours for 19 consecutive days every year in March. No other laws or established traditions are connected to the fasting days, leaving the individual and the respective communities to decide freely about individual and social aspects of the fasting time. For a better classification and systematic approach to the various forms of fasting please refer to Figure 1.

In our previous publications on BF, we reported on the safety, with no adverse changes in hydration indices observed. Effects found on our study population (n = 34) were a lowering of body mass index and total body fat mass, as well as a reduction in blood glucose and HbA1c. The circadian phase estimated by transcript biomarkers of blood monocytes advanced by 1.1 hours (n = 16) during fasting [13]. An analysis of some of the questionnaires addressing religious experiences in our sample showed an increase in religious experiences and mindfulness as well as a high sense of self-control/-efficacy during fasting [14].

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In the study arm presented here, we aimed to examine the immediate and long-term effects of a religiously motivated, temporal restriction of food and fluid intake on subjective health and well-being. Not only did we wish to get an insight on how fasting changes participants' lives during fasting, but also on how people feel about and prepare for the fast, as well as to understand its effects. Furthermore, we explored the nuances in motivation and importance to individuals undertaking this kind of fasting. We chose a mixed methods approach to better detail the complexity of the phenomenon, combining outcomes of qualitative individual and focus group interviews with selected survey data.

Methods

Study Design

The study data presented in this paper was collected as part of a larger, clinical longitudinal, self-controlled, exploratory cohort study conducted at the Charité - Universitätsmedizin Berlin including among other approaches a convergent parallel mixed methods design. The outcomes of the clinical and laboratory findings have been reported elsewhere [13, 15]. Questionnaire results specifying religious psychology and religious practice have also been published separately [14]. The institutional review board of Charité Universitätsmedizin Berlin (Charitéplatz 1, 10117 Berlin) approved the study protocol in January 2018 (ID: EA4/216/17). The study was registered with clinicaltrials.gov (ID: NCT03443739). Written informed consent was obtained from all participants prior to study entry. A detailed explanation of the main study design is found in our published study protocol [13].

Mixed methods combining quantitative and qualitative methods can increase understanding of complex issues and allows for the examination of findings from different vantage points (triangulation) [16]. They are especially suitable for health research, as a variety of methods enables researchers to better understand the complexity of issues [17], which in our case included social factors, personal behaviours [16] and beliefs associated with religious fasting.
In this study, we conducted questionnaires and interviews in parallel. Individual and focus group interviews were undertaken sequentially, the latter being implemented to verify the codes of the former. For an overview of the study timeline please refer to Figure 2. The study design is illustrated in figure 3, showing the different steps of data sampling, data analyzing and when integration of the results occurred. Data analysis was first conducted separately [17, 18], then

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findings were integrated from the quantitative and qualitative portions by iteratively comparing and contrasting the data. This procedure of data collection and analysis was planned a priori, and the outcomes had no effect on this methodology.

Setting

The study was conducted at Charité - Universitätsmedizin Berlin. The interviews were conducted at the Department of Integrative Medicine at the Institute of Social Medicine, Epidemiology and Health Economics (IM) in a separate room that provided a quiet space for open discussion, and the questionnaires were distributed online via email. The timing of the visits is shown in Figure 1.

*Figure 2: Timeline of data collection (V= clinical visit, VQ = questionnaires, (n)=number of participants at each visit, * for focus group interviews)*

Participants

For this study, 172 healthy Bahá'í volunteers were screened. 146 were considered eligible for the survey on patient reported outcomes and were enclosed between January and February 2018. Further details as well as eligibility criteria have been published elsewhere [13]. All eligible individuals filled out electronic questionnaires on subjective physical and psychological effects of Bahá'í Fasting. Of these, all participants living in the wider region of Berlin were invited to participate in laboratory tests, to which 34 subjects consented [13]. The interview sampling was chosen from this pool of participants. Individual interview and focus group sampling was based on the principle of maximum variation to balance gender and age. First individual interviews were undertaken with recruited participants to understand and explore concepts about fasting and religious practice on a personal level. After extracting our codes from these interviews, we invited participants to focus groups to investigate if and how the concepts found in the codes were discussed in a group setting. To avoid bias through influences of the semi-structured single-interviews and allow comparison between single-interviews and group discussions, we conducted one group discussion with interviewees who had participated in the single-interviews beforehand (focus group B), and one group discussion with respondents, who had not yet participated in any interview (focus group A).

Qualitative Design

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Semi-structured individual interviews

The interviews were generally timed according to when the participants came for the other study visits before, during and three weeks after the fast. Where this was not possible, suitable individual arrangements were made. For the semi-structured interviews at the baseline visit (V0) we developed a guideline based on clinical experience and previous research findings, without determining possible outcomes beforehand. The interview guideline focused on the meaning of fasting for the interviewees and its impact on their daily life and their perception of stress during and after the fast. Moreover, it contained questions on their motivation to fast, and whether there were other aspects but religious motivators, meaning and importance of communal activities and support during the fast, difficulties with fasting, and changes in dietary or other habits during the fast.

As spirituality and religiosity are concepts that are being discussed intensively in qualitative research settings and can be understood in different ways [19], which we did not aim to differentiate in our work, we decided to let the interviewee explain her or his concept of each category at the beginning of the first interview. By doing so, we ensured that the interviewer knew what the interviewee was talking about when using those terms and vice versa.

For the following two interview rounds (V1 and V2), we created an interview guide focused on topics emphasized by interviewees at baseline, a typical procedure for qualitative interviews [20-22]. Each interview was recorded with a recording device and was deleted after transcription. For interview-guidelines, please refer to Appendix A.

Focus groups

To validate the codes generated in the individual interviews, we conducted focus group interviews. Here the group was encouraged to openly discuss the topics the participants chose to focus on [23-25]. The focus group interview guide encouraged open discussion in the group. The guide asked for a definition of fasting, including health aspects and food intake, it asked to describe important aspects of fasting and asked the group about the difference between religious fasting and therapeutic fasting. Each interview was recorded with a recording device and was deleted after transcription. For the interview guide see Appendix B.

Quantitative Design

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The survey was conducted at five timepoints: before fasting (VQ0), on the first (VQ1) and third (VQ2) weeks of the fast as well as three weeks (VQ4) and three months (VQ5) later (for more details please refer to Figure 2). Quantitative data collection was done using electronic questionnaires using Limesurvey v2, running on virtualized machines on Charité's servers. Questionnaires used the validated German translations of the Short Depression and Happiness Scale (SDHS) [26], Hospital Anxiety and Depression Scale (HADS) [27], Mindful Attention and Awareness Scale (MAAS) [28], Profile of Mood States (POMS) [29], WHO-5 [30], Cohens Stress Scale (CSS) [31], and a self-efficacy scale (ASKU) [32]. Additional questionnaires focusing on religious experience and spirituality together with elements of a self-developed questionnaire specific to this religious fast (Bahá'í fasting experience) have been published elsewhere [14].

Data Analysis

Qualitative Data Analysis

All interviews were transcribed with f4transkript, then pseudonymized, openly and inductively coded within the software f4analyse, then condensed, summarized or specified , in order to find connections that would allow us to build categories following the principles of grounded theory [21]. Coding was done by RR, discussed and partly recoded by CE. Problems and conflicts in coding were discussed and reached consensus in regular meetings with further team members (NS and DL). The process of finding connections between single codes was characterized by consequent exchange between researchers about ideas on different passages, and comparisons about the current results of quantitative and qualitative methods. Memos were written to reflect on the research process. Repeated connections between different codes appeared through an iterative process of axial coding whereby connections developed into our categories.

Quantitative Data Analysis

The statistical analysis of the outcomes was an explorative one. All questionnaires were analysed using one-way repeated measures ANOVA with time as the fixed factor and subjects as random factors. Mauchley's-test was used to assess the assumption of sphericity. If needed, the common correction instruments of Greenhouse-Geisser and Huynh-Feldt epsilon were used. Analyses were based on an intention-to-treat approach using multiple imputation from the mice package. Post-hoc multiple comparisons were done using Student's t-test with Benjamini-Hochberg adjustment. 95%- confidence intervals were calculated, as well as omega-squared

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effect sizes. All statistical analyses were done using the statistical programming language R version 4.

1. Results

We interviewed four women and four men aged 21 to 69 (P1-P8). The main occupational characteristics that describe the interviewees are: two students, a person on long-term sick leave, a teacher, a psychotherapist, an artist (free-lancer), one geriatric nurse in training, and an office employee. At the first study visit time point (V0) we interviewed seven participants, and at the second study time point (V1) one more person was interviewed to balance out age. Therefore, 3 interviews were conducted with 7 interview partners and 2 additional interviews were conducted with the 8th participant. Out of these 23 interviews the three interviews of one interview partner were excluded from the analysis, because the interviewee struggled with language comprehension and interviews became too long and hard to understand, leaving space for misunderstandings and wrong interpretations. For Focus Group A we recruited five interviewees, two women, and three men, out of the pool of participants not having participated in the individual interviews. Main occupational characteristics that describe the focus group participants: an office employee, a former teacher, who had not been working for two years, two biologists, of whom one worked at a publishing house, and one chemist owning his own company. Focus Group B consisted of three former interviewees, two women, and one man. Focus groups took place at time point V3.

Questionnaires were sent out to 146 participants and collected at five separate time points: VQ0, VQ1, VQ2, VQ3 and VQ4. A description of baseline characteristics of participants can be seen in Table 1.

Qualitative interview findings

From the interviews we extracted 42 codes, which were summarized in three main categories: grounded in religion, elements of fasting and impacts of fasting.

Grounded in religion

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„I actually experience the scriptures as being the greatest support (...) and the providence that it (fasting) is a fixed component of Bahá'í life and included in these whole commandments is also this daily praying and meditating, which is intended throughout the whole year anyway, not only during the fasting period." - (P1, I1, section 78)

The motivation and endurance to fast was described to be based on lived religiousness, which included an inner mindset, a will for personal growth, as well as a marked dedication to religious ordinances. Religiosity was described as an expression of love and connection to God. Some interviewees understood spirituality as part of their religious belief, a mental attitude of how to connect with and perceive nature and others. For an overview of these results see Table 2.

Trust in God

All interviewed Bahá'ís described their behaviour as a deference to God's directive and an expression of trusting in God's word and his support. One interviewee described his trust in God as being so deep, that he would even do something that might not seem useful to him, if the word of God suggested it:
"I am convinced that all religious commandments that He gives us as individuals and as a society are good for us and lead us to progress. (...). So, if He said to run up and down the stairs two at a time, I would do it!" - (P7, I2, section 123).
Some interviewees reported that submission to God's will engendered the possibility to pass the responsibility over to God at the same time. For one person, this trust creates a feeling of security, wherefore *"the success of my life [is] (...) no longer strongly dependent on me, but on God"- (P1, I2, section 56)*

Meaning of religiosity for fasters

Religious laws were seen by all interviewees as an inherent part of Bahá'í religious life and fasting was described as a central part of those. To follow religious laws was either seen as a willing and voluntary submission to God´s will or as duty. While two interviewees described this duty positively, seeing it as a necessity for themselves, one said she had to accept it, because laws were necessary for group identity. This interviewee critically remarked she thought that laws made a group less open and flexible. On the other hand, she mentioned she was willing to accept challenges she would not accept otherwise because of these religious laws. Interviewees described religious laws as an "operating instruction" for personal growth (P4, I3, Sect. 102).

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Religious fasting was described as *„a spiritual [and] religious exercise, leading you closer to God"* - (P2, I2, Sect. 126). During the fast, interviewees reported focusing on their religion and improving their connection to God. The existence of the directive to fast was described as a supportive *"cornerstone for daily* life" (P5, I3, section 84).

"I think too little about my religion during the year and during these 19 days, I think about it more. (...) I read more of the texts and can tell that it does me good…Like a homecoming." (P2, I2, section. 80).

Elements of Fasting

We identified four main prerequisites for the fasting period, as expressed by several interviewees. These were described as: motivation, a sense of community, the opportunity to spend time alone and a changed daily structure. Table 3 summarizes these elements.

Motivation

As participants expressed the belief in the benefit of God's directives, they also expressed a high motivation to follow them. Repeating the fast annually, was described as reinforcing their described positive experiences, increasing their motivation to fast again. These experiences included physical well-being, a deepened feeling of religiousness and closeness to God, and an intensified feeling of connectedness with oneself. Additionally, some expressed the hope for a more conscious and healthier diet and a better-regulated eating behaviour. One person articulated the wish to lose weight, while another hoped for rejuvenating effects. Some of the interviewees mentioned experiencing a lighter feeling in their body through fasting and hoped to reexperience by fasting again. The outlook of an improved daily structure- and seeing the fast as a chance to set goals for the upcoming year were also mentioned. Nevertheless, these elements were described as side effects that would not be important enough to fast, were it not for the religious law.

Changed daily structure

Sunrise and sunset were seen as the most substantial influencing factors of day-to-day structure. As eating is allowed only between sundown and sunset, interviewees woke up early enough to eat and, of particular importance to all interviewees, pray before eating. For some interviewees, fasting created a structure that they normally did not have, which was described as beneficial.

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How intensely an individual experienced these structural changes as different from their normal life differed from person to person. While one interviewee did "not have to change [much], I just have to get up a little earlier" (P1, I1, Sect. 81), another described that life was *"really totally different: nutritionally, sleepwise (...) life is totally different." (P2, I2, section 25).* Some interviewees explained that fasting helped them reduce distractions and use their time in a more systematic way. For almost all interviewees it provided time to pray, read in the religious texts, and reflect on themselves, which was highly appreciated and valued during fasting. Challenges narrated by some interviewees were struggling to balance investment of time between the demands of the fast and their other obligations. One interviewee faced this challenge because of family life with young children, another one because of homework for university. Not having free time to focus on the fast and feeling pressured to work for university lowered reported well-being and joy of that interviewee during the fast.

Sense of community

The majority reported spending more time with their religious community, friends, or family during the fast. While the two youngest interviewees focused mainly on their Bahá'í friends during fasting, the older participants used the fast to connect with a wider community network of non-Bahai friends, family, colleagues, or neighbours, whereas the oldest interviewee focused more on her time alone instead of the time spent in company. She explained that, to know that *"there is a group of people who are in the same situation as me (...) and then it's more like a feeling of community."* was motivational, wherefore she did not necessarily need to meet her community in real (P6, I2, section 236). According to some participants, communication with Bahá'ís and non-Bahá'ís allowed for new perspectives on the religious texts and their lives. Three interviewees reported that intellectual exchange with other Bahai´s deepened insights in their religion, and for one it expanded her consciousness. Some interviewees mentioned that interaction with others helped them become aware of their own heightened sense of irritability or impatience during fasting. Realizing these tendencies was described as helpful, as the respective interviewees saw it as a chance to consciously change their behaviour.

Beside these valued aspects of socializing during the fast, some interviewees emphasized how breaking their fast in the evening in company made them eat more and heavier food and go to bed later than compared with eating alone, which made the next day more challenging. In contrast, four interviewees reported beginning the day with a collective breakfast was very

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supportive and enjoyable. They highlighted that this facilitated getting up early and intensified the act of praying or reading religious texts by discussing them in a group afterwards.

Opportunity to spend time alone

Meditating, praying, and reflecting on themselves and their lives were considered central elements of the Bahá'í fast by all interviewees. They reported changing their daily structure to make time to do so. While one of the two youngest interviewees did not profit from her time without the group at all and emphasized that she would have needed more time in community, the other one reported after the fast, that she had for the first time found out, that time on her own was also very valuable. All other interviewees emphasised the importance of having time alone for self-reflection and prayers. One interviewee stated that he appreciated time in community but believes that *„the way to the search for God needs to happen in solitude "- (P2, I2, section 98).* While one interviewee attributed her general *"need for more solitude"* to getting older, the interviewee with children especially valued his time alone, which was mainly before sunrise, because his children were still asleep. Another interviewee described:
"It was very precious for me, at least the freedom to be alone (...) because I find that during the fasting period personal reflection is also very important (...). The introspection. And you cannot do that in company." (P1, I2, section 122)

Impacts of Fasting

Interviewees reported that fasting changed their individual behaviour. They described bodily changes, increased well-being and mindfulness, the experience of discipline and freedom as well as changes in daily habits. Table 4 illustrates these findings.

Experiencing physical consequences of behavioural changes during fasting

The limited amount of time allowed for food and fluid intake during fasting was said to lead to a shift of attention to normally mundane, incidental tasks. All interviewees discovered effects of their behavioural changes on their bodies and their well-being.
"I think it really is this experience! This bodily experience of consciously restricting something during the day and feeling what it does within the body, and that it is actually good" (P1, I2, section 132). Many interviewees enjoyed the feeling of an empty gut, of physical lightness.

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Half of the interviewees emphasized how important it was that they went to bed early, and one interviewee linked the feeling of an empty, quiet stomach directly to feeling more energetic. During the fast, they discovered how lack of sleep had an intense negative impact on their physical. Through direct experience and awareness of how their body feels with a changed sleep schedule, and no food or drink during the day, under fasting circumstances, they noticed bodily changes more than usual. Interviewees reported employing different strategies to conserve their energy: moving more consciously and slower; being careful to avoid becoming dizzy; working less or stopping earlier; and, not talking much to avoid becoming thirsty.

" [The fast] feels really very good for my body always. I mean, to really try to go to bed early and always at the same time and then, of course, always getting up at the same time." - (P3, I2, section 128). One interviewee said that his body was suffering during each fasting period. But he explained that it was important for him to suffer, because he was overweight and it was only during the fast, that he gave room to the fact he should care for his body better. Interestingly, he reported eating very differently during the fast, explaining that he cooked with more vegetables, only white meat, and a lot of herbs, which he would normally never use.

Improved well-being

All fasters reported being happy about fasting itself. Even though it was described as burdensome by one interviewee, still he was glad that he had to focus on himself and his body and valued it as positive. Fasting was perceived as a physical and spiritual cleansing by two interviewees. During the fast, some interviewees described feeling light and relaxed, caused by their focus on their religion, their increased introspection, and the physical sensation of an empty stomach. By not overeating, eating qualitatively good food, drinking more fluids than usual after breaking the fast, and sleeping enough, many reported feeling physically comfortable. Except for one interviewee, all reported drinking more than usual to avoid thirst during the daily fasting interval. This one interviewee reported after the fasting period, that she was drinking more now than before and during the fast. One interviewee explained that only the fast reminded him of his body, which he stated not treating well enough in general. Although he stated he suffered from lack of sleep, hunger, and tiredness during fasting, he perceived it as positive and good, because it re-focused his attention and activities. *"it's cool to fast, take a break, to tell the body: 'now you'll do something else (...)' That's good. It permeates you, (...) that you get out of your normal routine, your normal lifestyle, to step aside. And sometimes it hurts. But because it pushes you, gives you another pulse. That is refreshing. That's beneficial"*

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(P2, I2, section 130). Early mornings, before sunrise in particular, were often mentioned as a very special and comforting time of the day. Interviewees underscored feeling more energetic than usual, after managing the first days of fasting. All interviewees reported being happy about fasting. Three interviewees were not as happy about their life circumstances during fasting, however, which forced two of them to focus on university and one to attend to the needs of his family instead of his own needs during fasting, but they stated they were pleased to fast because they were following the word of God.

Mindfulness

Interviewees reported very different experiences of increased awareness of their body, their surroundings, and others. Three interviewees described benefits in the form of greater consciousness and awareness. By not eating, some interviewees mentioned they experienced freedom from physical, mundane needs: *"The whole body is subordinated to the spirit" (P7, I2, section 61)*. Especially one interviewee stressed this freedom as an important outcome of fasting. Others emphasized a more transcendent experience in the sense of a higher sensitivity towards nature, and entering a dream state of mind while awake. Interviewees described learning to let go of more than only hunger and thirst. *"This moment of letting go. That you notice how many things feel easier because of it. I think that also influences daily life, starting the day more relaxed." (P1, I2, section 74)*. Accordingly, the majority of interviewees described fasting as *"a time where you become aware of what is central in life or where focus shifts on yourself." (P3, I1, section 43 - 44)*. Two of them spoke extensively about a feeling being described as finding one's place in the world, of being part of the larger order of the world and saw fasting as a *"recalibration of life" (P7, I1, section 48)*. Four interviewees reported being more aware of their feelings and emotions and that this helped them either to react more consciously, to not react but observe and reflect, or to feel more relaxed in stressful situations. All but one interviewee reported experiencing self-sufficiency and an increasing sense of empathy, becoming kinder and more affectionate. Additionally, one interviewee mentioned a renewed sense of inner balance, *"I had this feeling [of] becoming one with myself again." (P1, I1, section 56)*

Discipline and freedom

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Challenges were reported by all interviewees, especially during the first days of fasting. During lunch time some felt hungry, and noticed the fact that they were not allowed to eat. In the afternoon some felt tired or cold. Although the Bahá'í fast is a dry fast, not allowing for food or drink during daylight hours, thirst was only reported by one interviewee, who reported speaking too much, having a dry mouth afterwards. However, a few interviewees mentioned irritability due to hunger and reported strategies they developed to face this challenge, for example "*…to preferably just go to bed and wait for hunger to pass, sometimes" (P5, I1, section 80)*. The sense of hunger was reported by three interviewees to decrease after the first few days. Experiencing the ability to apply the required discipline to manage these challenges was reported by all interviewees to be a decisive factor for persevering during difficult times of fasting. Feeling good while fasting strengthened resolve. "*If I can simply say 'No, I can decide now'. Even if my body wants something else, then I am free." (P5, I1, section 33)*. This effect was reported by some interviewees as one of the longest lasting, most crucial consequences of fasting with the largest influence on their general life, as they learned to decide more freely.

Changes in daily habits

During the fasting period, interviewees described the measures they took to prepare for the fast that gave structure to their daily activities. Every interviewee had an individual way of preparation: Two described a reduction of the amount of food intake one week before, another hid all her sweets, someone else planned his food shopping to avoid having to do a lot of it during the fast. One pre-cooked all meals for the whole fasting period, one planned which of the religious texts he would read during fasting. Two interviewees prepared mentally by increasing reflection on the upcoming fasting period, and one interviewee reported having downloaded a prayer-app on his smartphone, which would support the reading of religious texts in the early mornings. Interviewees described starting preparations as early as January and as late as a few days before fasting started. Just before the fast starts there are a few days of Bahá'í festivities that were rated as an important preparation by some interviewees. Interviewees reported changing different aspects of their eating behaviour also during fasting. Every interviewee reported drinking more during fasting than before, and at least one person said, she would still drink more after the fasting period. All interviewees ate less. Some gave up sweets, chips, and other snacks during fasting, and tried to make it last after the fasting period. One interviewee, who normally ate a lot of meat, increased the number of vegetables during fasting, another one focused on including more fruit in his diet. Almost all interviewees reported

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enjoying food itself more, eating more slowly and consciously, and aimed to continue this after fasting. Only one interviewee described the change in his eating habits as difficult and not enjoyable. Four of the interviewees wished to integrate their new food habits into their daily life after the fast, including the amount of food intake and, for one interviewee, regular eating times. The aim to change behaviour long-lastingly was reported to be an annual response to fasting, but most highlighted that they did not expect to be able to keep up much effect from the intense positive changes.

"Nineteen days is not long, but it seems to be long enough to establish new habits"- (P7, I1, section 173). Lasting effects varied individually. Shortly after fasting, most interviewees still felt impacts of fasting on their concrete behaviour. One reported she was not hungry at lunch time, another that she was drinking more than before. Changes in daily structure allowed for more religious practices, which all wished to keep in their everyday lives. *"Before fasting everything was very normal in daily life, daily routine patterns (...) During fasting, about different elements of life, somehow more reflected and deliberate. (...) And afterwards is when you try to keep it, or some elements of it or so. I am still trying to tweak some small parts, I would say*." - *(P3, I3, section 21)*

Focus groups

Focus group B discussed fasting as a way of healing that is different from non-religious fasting because it includes not only physical, but also spiritual aspects like love and connection to God, as an act of cleansing of the outer and inner body. Mainly driven by one interviewee, focus group B discussed more about religious aspects of fasting than focus group A. Both groups talked about the importance of social support during the fast. The role of the family was emphasized, whose members may not be Bahá'ís but support the person fasting, in addition to the religious community. Focus group A emphasized the importance of having time alone for reading in the holy scriptures, praying and meditating. Regarding changes experienced during fasting, focus group B talked extensively about drinking and eating habits. Main discussion points that were how thirst was not felt during fasting and hunger was not experienced strongly, as well as the enjoyment of eating less. They discussed how changes in their eating habits seemed to last. In contrast, focus group A focused on changes of their daily structure, and fasting as an exercise of detachment. Experiencing discipline, challenges and chances for personal growth were mentioned in both groups, such as increased well-being through fasting and the strengthened connection to God. Both groups discussed aspects of mindfulness, such

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as awareness and reflection of themselves and others, being more empathetic, and being able to let go of arising emotions, increased through fasting: *"In the end it's all a practice in letting go." (Focus group A, section 40)*. "*Through sacrifice of fundamentally different things in life, I gain greater consciousness*." *(Focus group B, section 6).*

Quantitative findings

The positive effect on mindfulness was the most pronounced and sustained effect (CI 95% [0.03, 0.11], $p < .001$, ω-squared= 0.07). Quality of life improved during fasting (WHO5: CI 95% [0.00, 0.06], $p < .001$, ω-squared = 0.03), as did stress and anxiety symptoms (CSS-10: CI 95% [−0.01, 0.02], $p < .01$, ω-squared = 0.01; HADS anxiety: CI 95% [0.04, 0.12], $p < .001$, ω-squared = 0.08). Measures of fatigue decreased during the fasting period (POMS Fatigue: CI 95% [0.00, 0.06], $p < .01$, ω-squared = 0.03; POMS Dejection: CI 95% [0.00, 0.05], $p < .01$, ω-squared = 0.02). No significant effects were identified for SDHS (CI 95% [−0.01, 0.02], $p = 0.182$, ω-squared = 0.00), HADS depression (CI 95% [−0.01, 0.01], $p = 0.517$, ω-squared = 0.00), self-efficacy (ASKU: CI 95% [−0.01, 0.02], $p = 0.152$, ω-squared = 0.01), vigour (POMS vigour: CI 95% [−0.01, 0.01], $p = 0.367$, ω-squared = 0.00) and displeasure (POMS Displeasure: CI 95% [−0.01, 0.01], $p = 0.592$, ω-squared = 0.00). For more details please refer to Table 2 and the graphical illustration of results in the Appendices 3-13.

3.3 Integration of results

Summarizing the results, interviews and questionnaires found increases in mindfulness and well-being (in the questionnaires MAAS and WHO-5, for the interviews codes "mindfulness" and "well-being").

Stress and anxiety showed a reduction in the questionnaires CSS and HADS anxiety, while in the interviews the codes "trust in God", "specific social environment" and "opportunity to spend time alone" show different aspects of attitudes and behaviour, that could be interpreted to be conducive to this reduction.

The ASKU questionnaire measuring self-efficacy showed high scores in our survey sample already at baseline and did not show significant changes during fasting. On the contrary, in the interviews the topic of a rise in self-awareness and -efficacy was mentioned under the codes "motivation" and "discipline and freedom".

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While in the interviews certain "changes in daily structure" are reported, which could result in a rise in fatigue, the questionnaires showed a decrease in fatigue during fasting (POMS fatigue).

Discussion

To our knowledge this is the first mixed methods approach to Bahá'í fasting, exploring a wide variety of effects on the physical, emotional, and mental levels of followers. The changes in daily routines and the experience of fasting in general seems to cause a rise in mindfulness and well-being, alongside a mild anxiolytic and stress-reducing effect. Findings on self-efficacy seem to vary between qualitative and quantitative findings.

Higher levels of mindfulness being achieved by a dietary intervention like fasting has not, to our knowledge, been described in the literature before. Mindfulness embedded in meditation was described by Kabat-Zinn as moment-to-moment awareness [33], while mindfulness as a mind-set was explained by Langer and Moldoveanu as a "process (…), which produces a greater sensitivity to one's environment" [34]. We observed both characters of mindfulness in Bahá`í fasting. Fasting seems to influence the fasters´ ability to recognize somatic and psychological changes within themselves and to connect better to the outside world. Their ability to observe themselves, letting go, and accept the present moment rather than reacting to it is typical for mindfulness practices [33]. Interestingly, mindfulness was increased without any obvious mindfulness intervention, but seems to have been caused by a focus on religion and religious practices. Besides that, neurobiological effects could be considered. Food-restriction has been found to potentially increase sensitivity to and levels of serotonin [35-37], which could cause transcendental experiences [36]. Besides, choosing a mindful approach in stressful situations has been shown to serve as a coping mechanism that enhances resilience and reduces stress [38-40].

The stress-reducing effects of mindfulness as well as its anti-depressive and anxiolytic effects [33], could partly explain our findings regarding increased well-being and reduced stress-levels through fasting. Additionally, the increased religiosity that were reported as well as changes in health-related behaviour probably contributed to this effect. Well-being describes the cognitive and affective appraisal of one´s life. It has many aspects, covering physical, mental, social and spiritual parts [41, 42]. We found BF to target all these aspects. Participants reported feeling well physically with their changed daily habits during fasting, while mindfulness touches on

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the mental level of well-being. They also reported various moments where they experienced social support. This showed itself either mentally, by knowing they were not fasting alone, or directly in personal interaction, which helped them to overcome challenges during fasting. Besides that, one aim of Bahai fasting that was reported, was that it brings about a positive change in society by a personal change towards a better version of oneself. Feelings of being valued by society and valuing society increase social well-being [43]. There seems that the belief, that there are people who will support with the needed resources, not necessarily the personal interaction itself, can by itself lower the stress-response [44]. The spiritual aspect of well-being can be seen in our data by the description of the personal, meaningful and fulfilling relation the participants described having to God being reinforced by the act of fasting [45]. Our findings are in line with findings on Ramadan fasting, as reported in a recent systematic review and meta-analysis on the subject: Ramadan fasting was found to have a positive influence on stress, anxiety, and depression in the five studies analysed [11]. The authors suggest lifestyle factors such as sleep deprivation as possible reasons for these effects [11]. From our findings we suggest that one strong influencer of personal well-being probably contributing to the observed psychological effects can also be self-efficacy [46, 47].

Regarding self-efficacy, our qualitative and quantitative findings seem to be contradictory. The fact that the ASKU questionnaire does not show any significant changes might on the one hand be related to the high scores that our sample had at baseline and on the other hand to a lacking sensitivity of the questionnaire to changes occurring in a short period of time. The rise in self-efficacy reported in the interviews is in line with the findings of Maniaci et al that have described improved self-efficacy through a fasting mimicking diet [48]. Increased self-efficacy is known to lower stress reaction [49, 50], increase positive emotional affects, and lower anxiety [47], effects that we can also find in the CSS, WHO-5 and HADS anxiety questionnaires, making it more likely that the ASKU did not have the sensitivity to show the changes in self-efficacy that we found reported in the interviews. Our interviewees expressed their heightened sense of self-efficacy as the ability to combat uneasiness due to hunger, sleep-deprivation or emotional disgruntlement by an inherent belief that they possessed the discipline to master the challenge of fasting. According to the transtheoretical model (Prochaska, Di Clemente, 1982), expected self-efficacy grows with repetition of an action [46], wherefore difficulties could become easier to manage with every year of fasting. Most importantly, enhanced self-efficacy was reported in the interviews even after the conclusion of fasting and could thus influence stress-response in daily life for a prolonged period of time. One of the strongest influences on

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self-efficacy is the first experience of successfully managing a challenge, wherefore practice and behavioural training are especially critical for self-efficacy [46]. As all our participants reported having fasted at least one time before (see Table 1), this could explain why our sample already scored high on self-efficacy at baseline. This argument is supported by preliminary findings that show how previous fasting experience positively influences mood states in a current fasting situation [51]. The belief in one´s own self-efficacy expectation, which is the belief of having the competence to master a challenge, seemed to be strengthened by the interviewees' trust in God. Certainly, the link between religion, self-efficacy, and fasting would need further research with a larger study population.

What seems to be striking regarding our results is the very positive connotation fasting seems to have for Bahá'ís. In the research on the historic origin of eating disorders religious rules have been discussed in the past[52], raising an awareness of the fine line between fasting and eating disorders in general. As for therapeutic prolonged fasting, there are no published findings to support an induction of eating disorders [53, 54]. Adding to this, one study in hospitalized fasting patients has described that the length of abstinence from food had an impact on how participants felt about eating, the first few days actually enhancing emotional fixation on food while longer fasting periods lead to a lack of appetite and fears regarding re-introduction of food [55]. Viewed in the light of these preliminary findings, BF being only observed for a certain part of the day could probably be regarded as even safer than prolonged fasting regarding the induction of eating disorders. In a trial on a mainly Christian population in Finland, no association between religiosity and eating disorders could be found [56], while in a Muslim population in the United Arab Emirates there seemed to be an association between the two [57]. It seems that the way religiosity is understood and lived makes the difference [58]. Having said this, there is one more point that drew our attention. In eating disorders, the act of eating and the perceived body shape are central elements of the pathology. In the questionnaires as well as in the interviews we could not detect such a focus. On the contrary, the findings in our sample point to an increase in self-transcendence [14] and a heightened awareness for one's bodily needs. In future trials these aspects should be taken into account, while exploring protective factors for eating disorders in different fasting regimen, be they religious or therapeutic.

Our study has certain limitations, we want to address here: In the qualitative part of this study, to a large extend analyzed by two researchers (RR and CE), there is a possibility of subjective

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bias. We tried to address this problem by creating inter-reliability through constant exchange and discussions about codes, categories and theory with CE, NS, WS, BS and DL and merging the results with those of the questionnaires. We also made use of natural language processing to verify our codes, the results of which will be published in another paper. In the questionnaire survey we used some clinical questionnaires on healthy individuals, not suffering from any clinically relevant condition. This limited sensitivity of the questionnaires for the study population resulted in high baseline scores and non-significant results in some of them. Additionally, a selection bias is probable for both methods, due to the voluntary participation in the study, as well as a social desirability bias, as our sample seems to show a high sense of religiosity. This possible bias must be given even more weight given the absence of a control group. On the other hand, the repetition of the interviews and questionnaires over a relatively long period of time allows for a certain reliability of the measured outcomes.
The long follow-up is also a marked strength of this study, as is the synchronicity of sampling in both qualitative and quantitative methods. Also, the use of focus group interviews to validate the codes derived from the individual interviews and the relatively large sample size for the qualitative part of the study add to the reliability of the data.

The results presented here supported the interpretation of the laboratory and physiological data we collected in the sample. For example, we had expected to see at least a slight dehydration during fasting, as fasters would not drink during daylight hours for 19 consecutive days. Surprisingly, in many participants we not only saw no dehydration, but they seemed to have a better hydration than at baseline. Interviewees during fasting reported drinking more fluids in the morning and evening and being more conscious about their hydration than usually, making a behavioural change a probable cause for our laboratory findings. Also, the time-shift of -1.1 hours on average seen in the circadian phase could be explained similarly, as most interviewees reported having a meal before sunrise, this often being earlier than their normal breakfast. As meal-timing can be a strong influencer of circadian rhythms, this could have contributed to the observed shift.

Reflecting the outcomes reported in our paper on the religious aspects of BF [14] in light of the findings presented here, there might be an interesting link between difficulties experienced by fasters and their sense of achievement and freedom. As reported in our previously mentioned paper, it seems that the intensity of the challenges faced during fasting correlate with the outcomes in mindfulness and well-being. Interviewees reported that mastering the challenges

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presented by fasting gave them a sense of freedom. The link between the rise in mindfulness and well-being to the challenges of the fast could be the reaction to these difficulties as described by the interviewees.

2. Conclusion, generalizability and future work

Compared to Ramadan and other models of intermittent fasting, this type of fasting is relatively short and easy to undertake, its safety being indicated by our laboratory findings [13]. It seems to offer a chance to improve mindfulness, health-related behaviour, and subjective well-being. Having these effects in mind, it is important to conduct further research about intermittent dry fasting in the Bahá'í religion as well as in other religious contexts. It could also be of interest to examine whether similar effects can be achieved without a religious setting. If further research supports our findings, an annual repeated 19 days intermittent dry fast such as BF could enrich medical and psychological therapeutic options, equipping patients with resources to enhance their overall health and well-being.

3. Abbreviations

BF Bahá'í Fasting

IM Department of Integrative Medicine at the Institute of Social Medicine, Epidemiology and Health Economics

Table 1: Baseline sociodemographic data of participants in questionnaire survey

	n=146 **Mean (SD)**
Current age in years (mean (SD))	45.19 (13.85)
Sex (mean (SD))	1.45 (0.50)
Education (%)	
Still at school	0 (0.0)
Primary/secondary school graduate	4 (2.8)
Polytechnical secondary school graduate	1 (0.7)

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Higher qualification secondary school graduate (Realschule)	4 (2.8)
High school graduate	34 (23.6)
Technical college or University graduate	95 (66.0)
other	6 (4.2)
Gross wage/year (%)	
< 20.000 Euro	60 (41.7)
20.000 - 40.000 Euros	30 (20.8)
40.000 - 60.000 Euros	19 (13.2)
60.000 - 80.000 Euros	14 (9.7)
>80.000 Euros	21 (14.6)
Fasting experience in the past (%)	
Yes, once	1 (0.7)
Yes, more than once	142 (98.6)
none	1 (0.7)
Kind of fasting experienced in the past (%)	
Prolonged therapeutic fasting	2 (1.4)
Religious fasting	138 (95.2)
Intermittent fasting	1 (0.7)
Other	2 (1.4)
Not specified	2 (1.4)
Duration of fasting experienced in the past (mean in days (SD))	18.64 (3.65)
Frequency of fasting in the past (%)	
Less than once a year	9 (6.3)
1-2 times per year	128 (90.1)
3-5 times per year	2 (1.4)

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6-9 times per year	1 (0.7)
More than 10 times per year	2 (1.4)
Anticipated difficulties with fasting (%)	
Very easy	12 (8.3)
Easy	96 (66.7)
Difficult	34 (23.6)
Very difficult	2 (1.4)

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Table 2: Grounded in religion

Category Sub-category	Code	Mentioned by
Trust in God		
	Hand over responsibility to God	P7, P6, P5
	Submit to God	P3, P6, P2
	Trust in God´s word	P1, P2, P3, P4, P5, P6, P7
	To find security in religion	P1
Meaning of religiosity in life of fasting persons	Religious laws	
	Fasting means to align oneself with God	P1, P2, P3, P4, P5, P6, P7
	Fasting is a central part of a religious life	P3, P1, P7, P5, P2
	To be Bahai means to aim for progress	P3, P1, P7, P5
	To do something good for the society	P1, P7, P4, P2
		P1, P7, P2

Table 3: Elements of fasting

Sub-category	Code	Mentioned by
Motivation		
	Motivation	P1, P7, P4, P6, P5, P2
	Expectations	P3, P1, P7, P4, P5
Changed daily structure	Structuring the day	P3, P1, P7, P4, P6, P5, P2
	Traditions	P1, P7, P6, P2
	Intensify religious practices	P3, P1, P7, P6, P2, P5
Sense of community	Religious meetings are a source of well-being	
	Social support	P3, P1, P5
	Influence of community life on lent	P3, P1, P7, P4, P6, P5, P2
	Exchange with others influences the faster	P3, P1, P7, P4, P6, P5, P2
The possibility to spend time alone	To have time on my own	P7, P4, P6, P5
Descriptions of moments alone, values and importance of that time		P3, P1, P7, P4, P6, P5, P2

Table 4: Impacts of fasting

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Sub-category	Code	Mentioned by
Experiencing physical consequences of behavioural changes		
Impact of actions and experiences on oneself	To get to know myself better	P3, P1, P7, P4, P6, P5
Concrete actions that impact the body	To experience what is good for my body	P3, P1, P7, P4, P6, P5, P2
Improved well-being	To influence well-being Doing good to myself To value fasting as positive Energy Lightness Cleanse contentment	P3, P1, P7, P4, P6, P5 P3, P1, P7, P4, P6, P5, P2 P1, P7, P4, P5, P2 P1, P7, P6 P1, P7, P4, P6 P3, P1
Mindfulness *A feeling of order, classified as part of the World, recalibration*	Feeling placed yourself in the world part	P4, P7
Letting-go, not reacting,take distance, seeing clearly, reported mindfulness, meditative actions, special sensations (feeling grounded, feeling of lightness)	Mindfulness	P1, P4, P6, P5
Awareness, consciously doing something, feeling more conscious	Higher awareness	P3, P1, P4
Focus/concentration on myself, focus on the central in life	Focus changes	P1, P7, P4, P6, P5
Being more sensitive, empathetic, forgiving, friendly, loving, open to others	Being more sensitive and empathetic	P3, P1, P7, P4, P6, P5
Reflections about life, small things, feelings, self-reflection	Reflecting over myself and life	P3, P1, P5
Body submits to mind, decisions free of physical needs, of constraints of nature, of the mundane, a state of dreaming while awake	Overcoming the mundane	P3, P7, P5, P2

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With God, with others, with oneself, with nature	Connectedness	P3, P1, P7, P4, P6, P5
Discipline and freedom	Freedom	P7, P4, P5
	Challenges	P3, P1, P7, P4, P6, P5, P2
	Discipline	P3, P1, P7, P4, P6, P5, P2
	Development	P3, P1, P4, P6, P5, P2
Changes in individual behaviour	Assistive preparations for fasting	P3, P1, P7, P4, P6, P5, P2
	To create new habits	P3, P1, P7, P4, P6, P5, P2
	To eat mindfully	P3, P1, P7, P4, P6, P5, P2

To clarify the meaning of the complex term “mindfulness”, each code comes with an explanation under which premises it was used.

Table 5

Repeated measures ANOVA results

	df_{Num}	df_{Den}	*Epsilon*	SS_{Num}	SS_{Den}	*F*	*p*	η^2_g
ASKU	3.30	478.93	0.83	1.54	127.84	1.74	.152	.00
CSS	3.83	555.12	0.96	2.63	99.86	3.81	.005	.01
HADS Anx	3.75	544.34	0.94	4.05	43.95	13.36	.000	.03
HADS Dep	3.63	526.37	0.91	0.21	38.13	0.80	.517	.00
MAAS	3.46	502.23	0.87	7.62	89.55	12.34	.000	.02
POMS Mis	3.71	537.79	0.93	0.52	109.17	0.68	.592	.00
POMS Müd	3.68	533.15	0.92	11.51	305.96	5.45	.000	.02
POMS Nie	3.47	502.65	0.87	3.22	105.94	4.41	.003	.01
POMS Tat	3.79	550.04	0.95	1.96	264.81	1.07	.367	.00

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SDHS	3.82	553.35	0.95	0.70	64.84	1.58	.182	.00
WHO-5	3.76	544.96	0.94	8.27	225.65	5.31	.000	.02

Note. df_{Num} indicates degrees of freedom numerator. df_{Den} indicates degrees of freedom denominator. Epsilon indicates Greenhouse-Geisser multiplier for degrees of freedom, *p*-values and degrees of freedom in the table incorporate this correction. SS_{Num} indicates sum of squares numerator. SS_{Den} indicates sum of squares denominator. η^2_g indicates generalized eta-squared.

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1 Figure 1: Overview of fasting regimens

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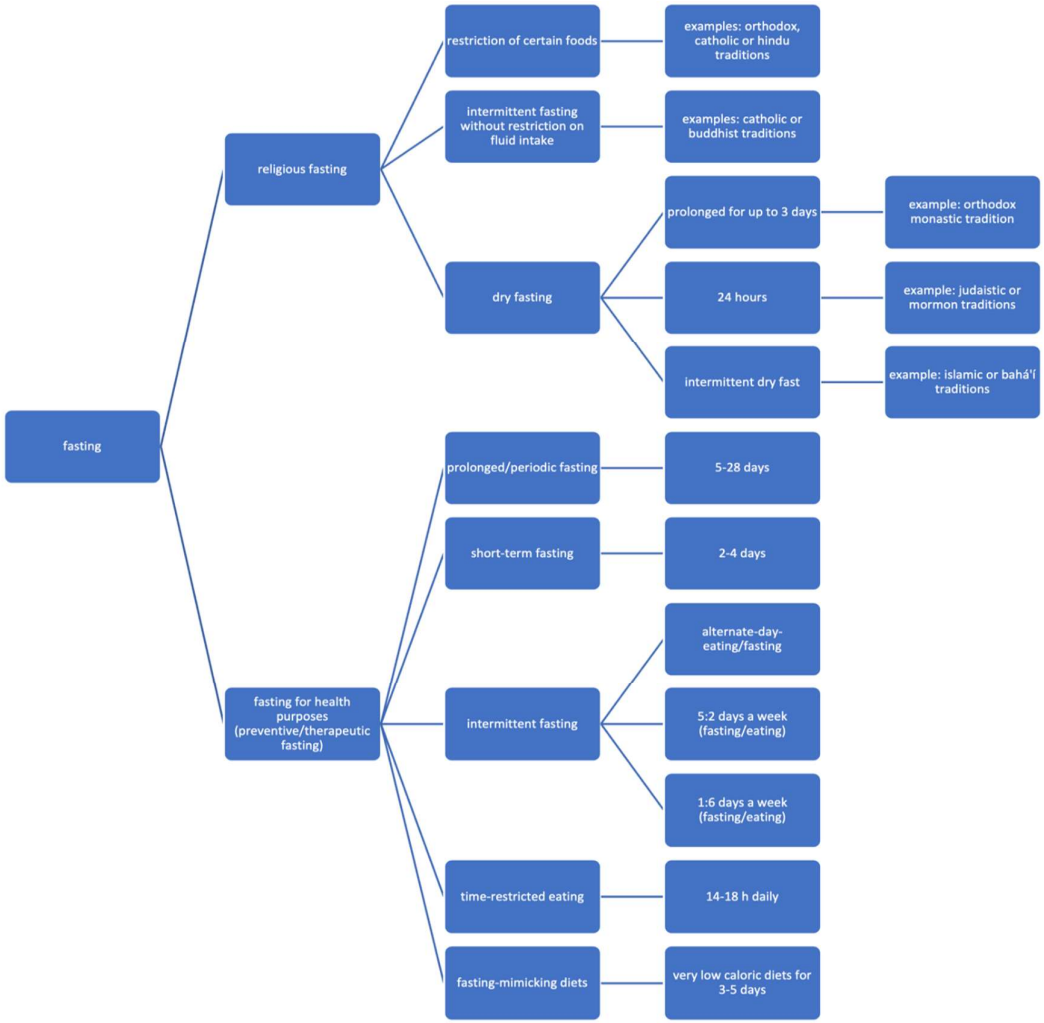

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Figure 2: Timeline of visits

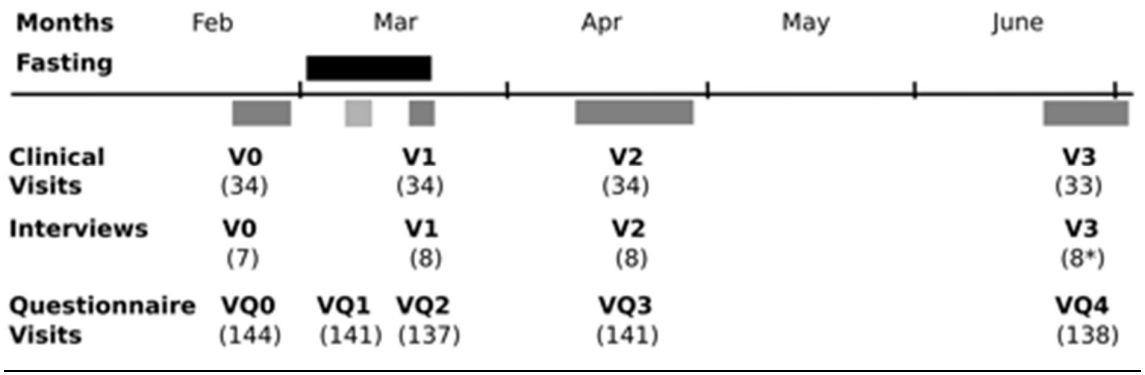

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Figure 3: Study Design