



Impact of Celiac Disease on Dating

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Abstract

Background/Aims When seeking a romantic partner, individuals with celiac disease (CD) must navigate challenging social situations. We aimed to investigate dating-related behaviors in adults with CD.

Methods A total of 11,884 affiliates of the Celiac Disease Center at Columbia University were invited to participate in an online survey. Adults (≥ 18 years) with biopsy-diagnosed CD were included. Among the 5,249 who opened the email, 538 fully completed the survey (10.2%). The survey included a CD-specific dating attitudes/behaviors questionnaire, a Social Anxiety Questionnaire (SAQ), a CD-specific quality of life instrument (CD-QOL), and a CD Food Attitudes and Behaviors scale (CD-FAB).

Results Respondents were primarily female (86.8%) and the plurality (24.4%) was in the 23–35 year age range. 44.3% had dated with CD, and among them, 68.4% reported that CD had a major/moderate impact on their dating life. A major/moderate impact was more commonly reported among females (69.3%, $p < 0.001$), 23–35-year-olds (77.7%, $p = 0.015$), those with a household income $< \$50$ K (81.7%, $p = 0.019$), and those with a lower CD-QOL score (50.5 vs. 73.4, $p = 0.002$). While on dates, 39.3% were uncomfortable explaining precautions to waiters, 28.2% engaged in riskier eating behaviors, and 7.5% intentionally consumed gluten. 39.0% of all participants were hesitant to kiss their partner because of CD; females more so than males (41.1% vs. 22.7%, $p = 0.005$).

Conclusions The majority of participants felt that CD had a major/moderate impact on their dating life. This impact may result in hesitation toward dating and kissing, decreased QOL, greater social anxiety, and less adaptive eating attitudes and behaviors. CD and the need to adhere to a gluten free diet have a major impact on dating and intimacy.

Keywords Celiac disease · Gluten free diet · Quality of life · Interpersonal relations

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Introduction

Celiac disease (CD) is an autoimmune disease triggered by gluten ingestion in genetically predisposed individuals. Gluten is the general term for proteins found in various cereals, including wheat, barley, and rye. Exposure to gluten may trigger intestinal (diarrhea, constipation, abdominal pain, bloating) and/or extraintestinal symptoms (headaches, peripheral neuropathy, dermatitis herpetiformis, gluten ataxia) [1]. An oral gluten challenge in treated CD patients resulted in symptoms such as nausea and vomiting [2]. CD can result in malabsorption, leading to increased risk of osteopenia/osteoporosis and iron deficiency anemia. CD is also associated with increased risk of certain cancers [1].

The only treatment for CD is lifelong adherence to a gluten free diet (GFD). Once a GFD is initiated, the intestines begin to heal, and most individuals report resolution of symptoms [1]. Despite symptom improvement, a strict GFD must be maintained to prevent ongoing damage to the intestine as well as the symptoms induced by inadvertent gluten ingestion. The adverse impact of the strict nature of the diet has been well documented [3–6].

Beyond broader quality of life (QOL) concerns, an important facet of social behavior has yet to be studied in this population: dating. When seeking a new romantic partner, individuals often engage in social behaviors that are oriented toward food, most notably dining out at restaurants. This may pose unique problems and cause elevated anxiety when following a strict GFD. As such, there is reason to believe that those with CD may experience stress levels exceeding that of the general population when engaging in dating behaviors. The pressures of balancing adherence to a GFD while pursuing a relationship may pose unique challenges and result in increased levels of social anxiety, less adaptive eating attitudes and behaviors, and decreased QOL. In addition, having CD may result in different perspectives on dating and even foster different approaches toward securing a partner.

The purpose of this study was to investigate social behaviors, specifically dating-related behaviors, in a population of adults with CD, via the implementation of an online questionnaire.

Methods

Recruitment

Adults who had opted into an email distribution at the Celiac Disease Center at Columbia University were invited

to participate in a secure, self-administered survey via a web-based survey platform, Qualtrics XM. This extensive email list includes patients with CD and their parents, friends of the Celiac Disease Center, health care personnel, as well as members of industry. The initial email was sent out on May 18, 2020, and a reminder email was provided on June 1, 2020. The survey was closed to responses on June 15, 2020.

The inclusion criteria for this study were as follows: individuals 18 years of age or older, self-reported biopsy-proven CD, and currently following a GFD. All other respondents not fulfilling these criteria were excluded from the study; if responses to items used to determine eligibility were outside of the inclusion criteria (i.e., younger than 18 years of age, no CD diagnosis or diagnosis was not confirmed via intestinal biopsy, not following a GFD), the survey was terminated.

Participant Demographics

Demographics collected included participant gender, age, income level, educational attainment, and setting of residency (urban, suburban, rural).

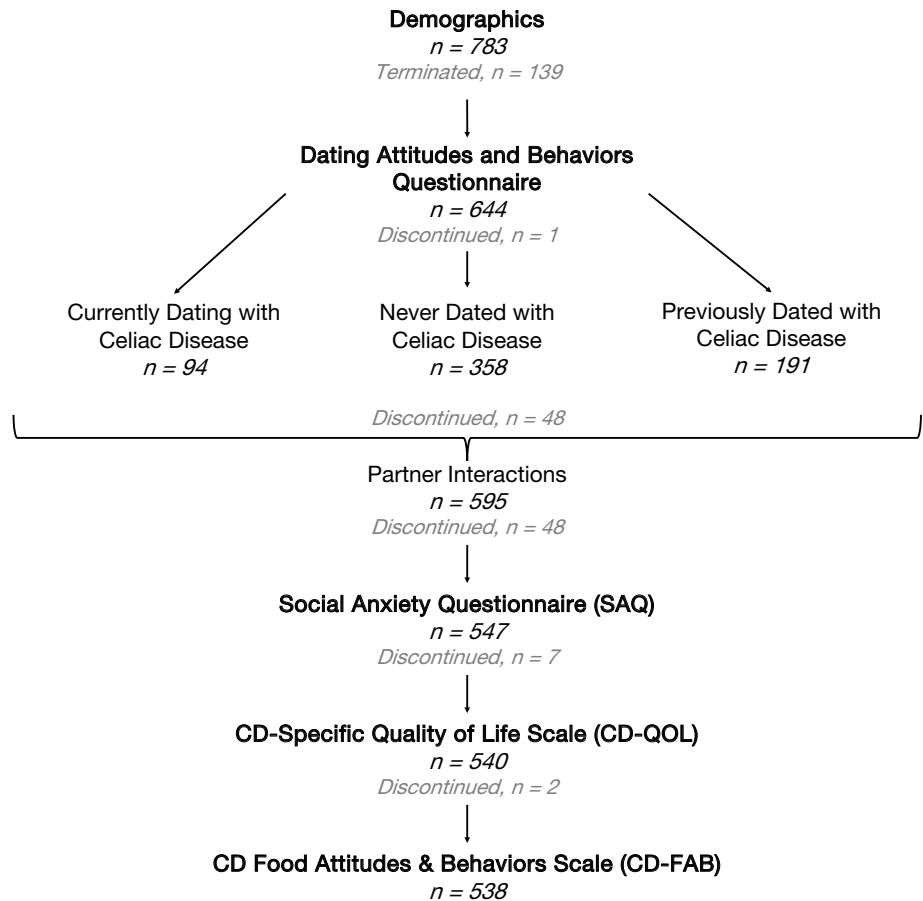
Study Measures

The survey included a Dating Attitudes and Behaviors Questionnaire (CD-specific dating attitudes/behaviors), a Social Anxiety Questionnaire (SAQ) [7], a CD-specific QOL instrument (CD-QOL) [8], and a CD Food Attitudes and Behaviors scale (CD-FAB) [9] (Fig. 1).

Dating Attitudes and Behaviors Questionnaire

As there were no CD-specific dating questionnaires in the published literature, we developed this questionnaire to assess social and dating behaviors of participants who have dated (i.e., while seeking a new romantic partner) while diagnosed with CD and following a GFD. All participants, including those who never dated while having CD, were also asked questions related to their relationships and physical intimacy (e.g., need for partner to follow GFD, hesitancy toward kissing partner, symptoms interfering with physical intimacy). We examined both face validity and conducted cognitive testing on our newly developed CD dating questionnaire. The questionnaire was developed based on concerns we heard from patients in the clinic regarding their difficulties dating with CD. The initial tool was developed by the lead author and 3 colleagues who have CD and have experience dating with CD. In addition, the 3 colleagues, as well as 10 other colleagues and students with CD experience reviewed the tool multiple times to determine clarity and understanding of questions. The full questionnaire is included in the Supplementary Materials.

Fig. 1 Survey flow diagram



Social Anxiety Questionnaire: SAQ

This is a validated 30-item survey reporting on interactions with strangers, speaking in public/talking with people in authority, interactions with the opposite sex, criticism and embarrassment, and assertive expression [7]. Participants responded to items on a 5-point Likert scale ranging from 1 (not at all or very slight) to 5 (very high or extremely high) to indicate the levels of unease, stress, or nervousness in response to each social situation. The overall questionnaire score was calculated by summing the response values for each item. Those with a higher SAQ score have higher levels of social anxiety. Based on a prior validation study, scores of ≥ 92 for males and ≥ 97 for females indicated a social anxiety disorder [7].

CD-Specific QOL Instrument: CD-QOL

This is a validated 20-item self-report tool used to assess the QOL in adults diagnosed with CD [8]. The tool assesses QOL within four domains: limitations, dysphoria, health concerns, and inadequate treatment. Participants respond to items related to specific concerns within each of these four domains (e.g., ‘I feel limited by this disease’; ‘I feel socially

stigmatized for having this disease’) on a Likert scale ranging from 1 (not at all) to 5 (a great deal). The overall questionnaire was reverse-scored and calculated by summing the response values for each item. Scores range from 0 to 100, and those with a higher CD-QOL score have a higher perceived QOL. Although there are no specific cut points, CD-QOL total scores ≥ 60 (out of 100) are generally considered to be in the ‘good’ range, as this level has been associated with individuals who reported the highest self-rated health (categories of very good and excellent) and daily function, as well as the lowest psychological distress and abdominal pain. CD-QOL total scores ≤ 40 (out of 100) are generally considered to be in the ‘poor’ range, as this level has been associated with individuals who reported the lowest self-rated health (categories of poor and fair) and daily function, as well as the highest psychological distress and abdominal pain. Others could be considered ‘moderate’ [8].

CD Food Attitudes and Behaviors Scale: CD-FAB

This is a validated 11-item self-report tool that queries eating attitudes and behaviors resulting from beliefs around gluten cross-contamination, trust, risk taking, and food safety. Participants respond to items related to these attitudes and

behaviors (e.g., ‘I get concerned being near others when they are eating gluten’; ‘My concerns about cross-contamination prevent me from going to social events involving food’) on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The final four items are reverse-scored, as they query adaptive responses to managing food attitudes without compromising lifestyle. The overall score can range from 11 to 77 and it was calculated by summing the response values for each item. Those with a higher CD-FAB score have less adaptive attitudes and behaviors related to CD and the GFD [9].

Statistical Analyses

Means, frequencies, and percentages were calculated and used to describe demographic characteristics of the study sample as well as to measure categorical data for each survey (e.g., degree of impact of CD on dating, degree of enjoyment of dating experience, willingness to engage in riskier eating behaviors). The total score for each instrument was calculated according to the individual tool scoring specifications and guidelines. The Z test was used to analyze differences in SAQ, CD-QOL, and CD-FAB scores between groups according to attitudes and behaviors regarding dating. A *p* value of less than 0.05 was considered significant.

Results

Among the 11,884 affiliates who were sent the email, 5,249 opened the message, and of these, 783 participants initiated the survey (14.9%). A total of 139 participants were disqualified due to the exclusion criteria described above, 106 participants partially completed the survey, and 538 participants fully completed the survey (10.2%, see Fig. 1).

Table 1 provides the demographic characteristics of the study sample. Participants were predominantly female (86.8%) and a plurality (24.4%) was in the 23–35 year age range, while 15.4% were over 65. 76.3% of participants were college or graduate school educated, and 51.6% had an annual household income greater than or equal to \$100 K. The majority (59.9%) lived in a suburban setting, and 29.7% lived in urban areas. The majority (62.6%) were married or engaged, while 29.7% were single. Among all participants (Fig. 1), 285 (44.3%) had dated with CD at some point in their life. Of those who had dated with CD, 191 participants (67.0%) previously dated with CD, and 94 participants (33.0%) were currently dating with CD.

Participants who have dated were asked how much CD affected their dating life. Answers of ‘A great deal,’ ‘A lot,’ and ‘A moderate amount’ were grouped under major/moderate impact, while answers of ‘A little’ and ‘None at all’ were grouped under no major impact. Among the

285 respondents who dated with CD, 272 answered this question, of which 186 (68.4%) reported that CD had a major/moderate impact on their dating life compared to 86 (31.6%) who reported that CD had no major impact (Table 1). Females were more likely to report a major/moderate impact as compared to males (69.3%, $p < 0.001$). Participants age 23–35 had the highest rates of reporting a major/moderate impact (77.7%, $p = 0.015$), while those over 65 years had the lowest rate of reporting a major/moderate impact (48.6%, $p = 0.012$). A major/moderate impact on dating was also commonly reported among those with an annual household income of less than \$50 K (81.7%, $p = 0.019$). Among those on the GFD greater than or equal to 10 years, 58.6% reported a major/moderate impact, compared to 75.6% among those on the diet for less than 10 years ($p = 0.004$, Table 1).

The plurality (47.2%) of participants shared their CD diagnosis between the 1st and 3rd date, followed by 43.2%, who shared prior to the first date, and 9.6% after the 4th date or once a relationship was established (Table 2). A total of 135 participants have had an online dating profile (49.8%) at some point in their life. 14.1% of those participants included that they had CD on that online platform. Nearly half (48.4%) were hesitant to go on dates due to their CD. The majority (81.3%) of participants preferred non-food-related activities for the first few dates. This included drinks or activities like movies or hiking, rather than meals (18.7%). Participants were asked to answer both whether they prefer to suggest where to go on dates and whether they prefer to select where to go on dates in two separate questions. Approximately three quarters of participants preferred to take an active role in choosing the setting of the date. Slightly more participants admitted to preferring the less assertive act of suggesting where to go rather than the more assertive act of selecting where to go, with 77.4% suggesting and 71.4% selecting (Table 2).

Respondents reported that dating posed obstacles to compliance with the GFD. While on dates, 39.3% of participants were uncomfortable explaining precautions to waiters in front of their date, 28.2% engaged in riskier eating behaviors on a date, and 7.5% intentionally consumed gluten on a date. While males were somewhat more likely to engage in these behaviors, these gender differences were not significantly different (Fig. 2). 16.7% brought their own food on a date and 7.6% owned a portable Nima gluten sensor (Table 2).

A major/moderate impact on their dating life was more commonly reported among those who included their CD diagnosis on their online dating profile (94.7%, $p = 0.022$), who were hesitant to go on dates because of CD (89.3%, $p < 0.001$), who reported a preference to select the setting of the date (75.6%, $p < 0.001$), who brought their own food on a date (88.1%, $p = 0.004$), who felt uncomfortable explaining precautions to waiters in front of their date (79.8%,

Table 1 Relationship between demographics and dating experience

	n (%) ⁺	Major/moderate impact on dating (n = 186) ⁺⁺	No major impact on dating (n = 86) ⁺⁺	<i>p</i> value	Not enjoyable (n = 51) ⁺⁺	Enjoyable/Neutral (n = 221) ⁺⁺	<i>p</i> value
<i>Gender</i>							
Male	83 (12.9)	26 (63.4%)	15 (36.6%)	<i><0.001</i>	4 (9.8%)	37 (90.2%)	0.166
Female	559 (86.8)	160 (69.3%)	71 (30.7%)		47 (20.3%)	184 (79.7%)	
<i>Age</i>							
18–22	58 (9.0)	33 (70.2%)	14 (29.8%)	0.901	5 (10.6%)	42 (89.4%)	0.173
23–35	157 (24.4)	80 (77.7%)	23 (22.3%)	<i>0.015</i>	23 (22.3%)	80 (77.7%)	0.307
36–45	119 (18.5)	24 (61.5%)	15 (38.5%)	0.420	10 (25.6%)	29 (74.4%)	0.332
46–55	109 (16.9)	20 (69.0%)	9 (31.0%)	0.889	7 (24.1%)	22 (75.9%)	0.593
56–65	102 (15.8)	12 (63.2%)	7 (36.8%)	0.801	3 (15.8%)	16 (84.2%)	0.970
Over 65	99 (15.4)	17 (48.6%)	18 (51.4%)	<i>0.012</i>	3 (8.6%)	32 (91.4%)	0.155
<i>Educational attainment</i>							
Some high school/graduated high school	36 (5.6)	17 (77.3%)	5 (22.7%)	0.486	4 (18.2%)	18 (81.8%)	0.831
Some college	117 (18.2)	35 (67.3%)	17 (32.7%)	0.984	7 (13.5%)	45 (86.5%)	0.374
Graduated college	229 (35.6)	75 (70.1%)	32 (29.9%)	0.722	25 (23.4%)	82 (76.6%)	0.158
Some graduate school or more	262 (40.7)	59 (64.8%)	32 (35.2%)	0.451	15 (16.5%)	76 (83.5%)	0.607
<i>Income level</i>							
<\$50,000	114 (17.7)	49 (81.7%)	11 (18.3%)	<i>0.019</i>	14 (23.3%)	46 (76.7%)	0.399
\$50,000–\$74,999	102 (15.8)	39 (75.0%)	13 (25.0%)	0.329	10 (19.2%)	42 (80.8%)	0.921
\$75,000–\$99,999	96 (14.9)	24 (58.5%)	17 (41.5%)	0.197	10 (24.4%)	31 (75.6%)	0.431
≥\$100,000	332 (51.6)	74 (62.2%)	45 (37.8%)	0.071	17 (14.3%)	102 (85.7%)	0.132
<i>Residence</i>							
Urban	191 (29.7)	80 (72.7%)	30 (27.3%)	0.256	19 (17.3%)	91 (82.7%)	0.722
Suburban	386 (59.9)	85 (63.9%)	48 (36.1%)	0.155	25 (18.8%)	108 (81.2%)	0.892
Rural	67 (10.4)	21 (72.4%)	8 (27.6%)	0.777	7 (24.1%)	22 (75.9%)	0.593
<i>Length of time on GFD</i>							
Less than 1 year	30 (4.7)	5 (62.5%)	3 (37.5%)	0.982	0 (0.0%)	8 (100.0%)	0.358
1–4 years	192 (29.8)	56 (74.7%)	19 (25.3%)	0.219	19 (25.3%)	56 (74.7%)	0.123
5–9 years	171 (26.6)	57 (78.1%)	16 (21.9%)	0.053	17 (23.3%)	56 (76.7%)	0.324
10 years or more	251 (39.0)	68 (58.6%)	48 (41.4%)	<i>0.004</i>	15 (12.9%)	101 (87.1%)	0.050
<i>Marital status</i>							
Single	191 (29.7)	106 (73.6)	38 (26.4)	0.066	30 (20.8)	114 (79.2)	0.437
Engaged/Married	403 (62.6)	65 (65.0)	35 (35.0)	0.436	15 (15.0)	85 (85.0)	0.295
Separated/Divorced/Widowed	50 (7.8)	15 (53.6)	13 (46.4)	0.118	6 (21.4)	22 (78.6)	0.898

Italic values are statistically significant

⁺Total number of survey respondents

⁺⁺Restricted to respondents [n = 272] who were asked about their dating experience

$p = 0.002$), and who engaged in riskier eating behaviors on a date (81.7%, $p = 0.007$, Table 2).

When asked whether the dating experience with CD was enjoyable, 18.8% reported that it was not. This rate of reporting unenjoyable dating experiences was higher among those who included their CD diagnosis on their online dating profile (47.4%, $p = 0.008$), were hesitant to go on dates because of their CD (32.8%, $p < 0.001$), preferred to suggest the setting of the date (22.1%, $p = 0.018$), preferred to select the setting of the date (23.9%, $p = 0.001$), brought their own food

on a date (40.5%, $p < 0.001$), were uncomfortable explaining precautions to waiters in front of their date (28.3%, $p = 0.003$), engaged in riskier eating behaviors while on a date (29.6%, $p = 0.009$), and owned a Nima sensor (42.1%, $p = 0.016$, Table 2). There were no differences in whether dating was enjoyable or not based on the demographic characteristics (Table 1).

The average SAQ score was 78.8(23.4), and 23.0% met criteria for a social anxiety disorder based on cut points. Overall, the mean CD-QOL score was 57.8(23.0), which is

Table 2 Relationship between dating behaviors and dating experience

	n (%)	Major/moderate impact on dating (n = 185) ⁺	No major impact on dating (n = 86) ⁺	p value	Not enjoyable (n = 50) ⁺	Enjoy-able/Neutral (n = 221) ⁺	p value
<i>Time until sharing CD dx (n = 271)</i>							
Prior to the first date	117 (43.2%)	81 (69.2%)	36 (30.8%)	0.868	25 (21.4%)	92 (78.6%)	0.357
Between 1–3 dates	128 (47.2%)	85 (66.4%)	43 (33.6%)	0.623	20 (15.6%)	108 (84.4%)	0.328
After date 4 or once relationship established	26 (9.6%)	19 (73.1%)	7 (26.9%)	0.739	5 (19.2%)	21 (80.8%)	0.874
<i>Online dating profile (n = 271)</i>							
Yes	135 (49.8)	94 (69.6%)	41 (30.4%)	0.825	29 (21.5%)	106 (78.5%)	0.336
No	136 (50.2)	92 (67.6%)	44 (32.4%)		22 (16.2%)	114 (83.8%)	
<i>Online dating profile included CD (n = 135)</i>							
Yes	19 (14.1)	18 (94.7%)	1 (5.3%)	0.022	9 (47.4%)	10 (52.6%)	0.008
No	116 (85.9)	76 (65.5%)	40 (34.5%)		20 (17.2%)	96 (82.8%)	
<i>Hesitant to go on dates due to CD (n = 252)</i>							
Yes	122 (48.4)	109 (89.3%)	13 (10.7%)	< 0.001	40 (32.8%)	82 (67.2%)	< 0.001
No	130 (51.6)	63 (48.5%)	67 (51.5%)		7 (5.4%)	123 (94.6%)	
<i>Preference for first dates (n = 252)</i>							
Meals	47 (18.7)	27 (57.4%)	20 (42.6%)	0.112	7 (14.9%)	40 (85.1%)	0.599
Drinks/Activities	205 (81.3)	145 (70.7%)	60 (29.3%)		40 (19.5%)	165 (80.5%)	
<i>Prefer to suggest setting of the date (n = 252)</i>							
Yes	195 (77.4)	138 (70.8%)	57 (29.2%)	0.154	43 (22.1%)	152 (77.9%)	0.018
No	57 (22.6)	34 (59.6%)	23 (40.4%)		4 (7.0%)	53 (93.0%)	
<i>Prefer to select setting of the date (n = 252)</i>							
Yes	180 (71.4)	136 (75.6%)	44 (24.4%)	< 0.001	43 (23.9%)	137 (76.1%)	0.001
No	72 (28.6)	36 (50.0%)	36 (50.0%)		4 (5.6%)	68 (94.4%)	
<i>Brought own food on a date (n = 252)</i>							
Yes	42 (16.7)	37 (88.1%)	5 (11.9%)	0.004	17 (40.5%)	25 (59.5%)	< 0.001
No	210 (83.3)	135 (64.3%)	75 (35.7%)		30 (14.3%)	180 (85.7%)	
<i>Comfortable explaining precautions to waiters in front of date (n = 252)</i>							
Yes	153 (60.7)	93 (60.8%)	60 (39.2%)	0.002	19 (12.4%)	134 (87.6%)	0.003
No	99 (39.3)	79 (79.8%)	20 (20.2%)		28 (28.3%)	71 (71.7%)	
<i>Engaged in riskier eating behaviors on a date (n = 252)</i>							
Yes	71 (28.2)	58 (81.7%)	13 (18.3%)	0.007	21 (29.6%)	50 (70.4%)	0.009
No	181 (71.8)	114 (63.0%)	67 (37.0%)		26 (14.4%)	155 (85.6%)	
<i>Intentional gluten intake on a date (n = 252)</i>							
Yes	19 (7.5)	15 (78.9%)	4 (21.1%)	0.432	3 (15.8%)	16 (84.2%)	0.979
No	233 (92.5)	157 (67.4%)	76 (32.6%)		44 (18.9%)	189 (81.1%)	
<i>Owned a Nima sensor (n = 251)</i>							
Yes	19 (7.6%)	17 (89.5%)	2 (10.5%)	0.069	8 (42.1%)	11 (57.9%)	0.016
No	232 (92.4)	154 (66.4%)	78 (33.6%)		39 (16.8%)	193 (83.2%)	

Italic values are statistically significant

⁺Restricted to respondents [n = 271] who were asked about their dating experience

considered a moderate QOL. The mean CD-FAB score was 43.1(15.3). Participants who reported that CD had a major/moderate impact on their dating life had lower (i.e., worse QOL) CD-QOL scores (50.5 vs. 73.4, $p = 0.002$) compared to those who reported no major impact (Table 3). The difference in QOL score was more pronounced when comparing the extremes: participants who felt that CD affected their

dating life ‘A great deal’ had a significantly lower QOL than participants who felt that CD affected their dating life ‘None at all,’ with scores of 33.9 vs. 83.3 ($p = 0.001$). Participants who reported that their dating experience was not enjoyable also had lower (i.e., worse QOL) CD-QOL scores (38.2 vs. 62.4, $p = 0.006$) and higher (i.e., less adaptive eating

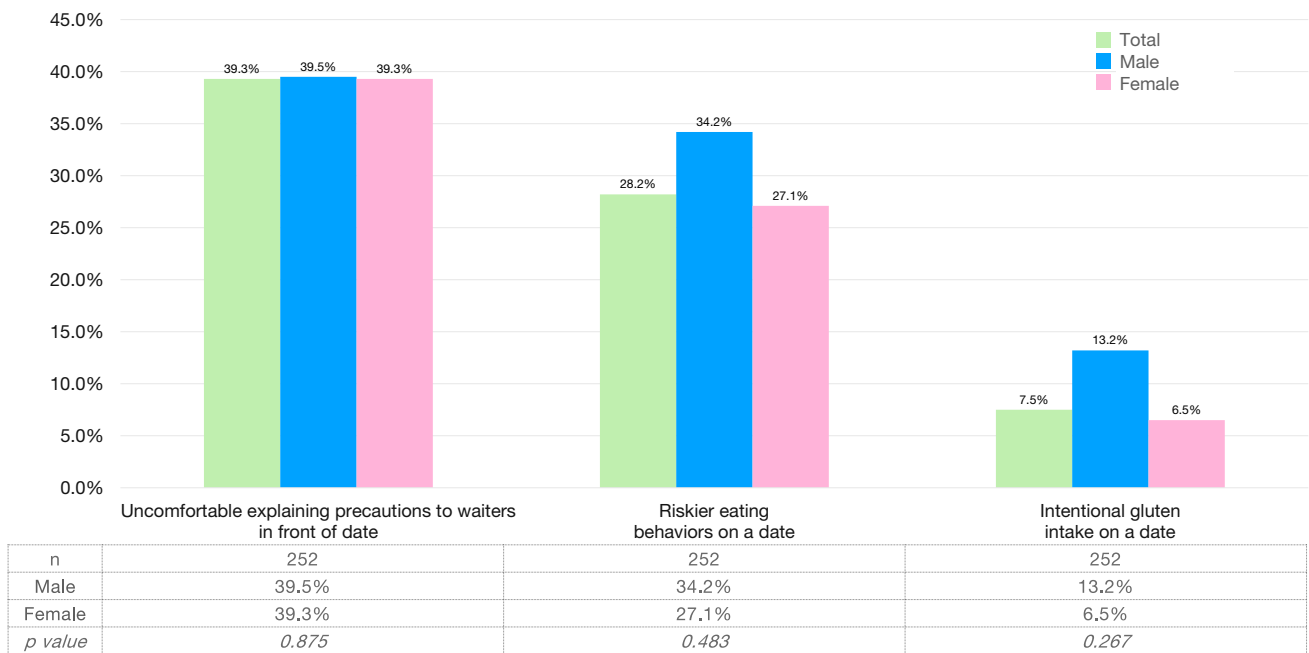


Fig. 2 Challenges to GFD compliance while dating with CD

Table 3 Relationship between anxiety, quality of life, food attitudes/behaviors and dating experience

Scale	n	Major/moderate impact on dating (n = 158)	No major impact on dating (n = 73)	p value	Not enjoyable (n = 45)	Enjoyable/Neutral (n = 186)	p value
SAQ ⁺ (mean(SD))	547	84.0 (23.7) n = 156	73.2 (20.6) n = 73	0.080	87.2 (23.8) n = 44	78.9 (22.9) n = 185	0.293
CD-QOL ⁺⁺ (mean(SD))	540	50.5 (21.2) n = 155	73.4 (18.5) n = 73	<i>0.002</i>	38.2 (19.6) n = 44	62.4 (21.2) n = 184	<i>0.006</i>
CD-FAB ⁺⁺⁺ (mean(SD))	538	46.0 (13.9)	32.1 (13.0)	0.065	55.7 (12.0)	38.1 (13.7)	0.050

Italic values are statistically significant

⁺SAQ: Social anxiety questionnaire: Higher values suggest higher levels of social anxiety

⁺⁺CD-QOL: Celiac disease-specific quality of life instrument: Higher values suggest higher perceived quality of life

⁺⁺⁺CD-FAB: Celiac disease food attitudes and behaviors scale: Higher values suggest less adaptive food attitudes and behaviors related to CD and the GFD

attitudes/behaviors) CD-FAB scores (55.7 vs. 38.1, $p=0.05$, Table 3).

Figure 3 exhibits the impact of CD on partner interactions by gender. 12.1% of respondents felt that their partner needed to also follow a GFD, while 39.0% were hesitant to kiss their partner because of the risk of gluten contamination; females more so than males (41.1% vs. 22.7%, $p=0.005$). 22.7% of survey participants reported that their symptoms interfered with being physically intimate; females more so than males (24.5% vs. 10.7%, $p=0.012$).

Participants who were hesitant to kiss their partner had higher (i.e., worse social anxiety) SAQ scores (84.4 vs. 75.0, $p=0.012$), lower (i.e., worse QOL) CD-QOL scores (48.0 vs. 64.2, $p<0.001$), and higher (i.e., less adaptive eating attitudes/behaviors) CD-FAB scores (51.3 vs. 37.7, $p=0.002$). Participants who reported that their symptoms interfered with being physically intimate also had higher (i.e., worse social anxiety) SAQ scores (85.4 vs. 76.7, $p=0.045$), lower (i.e., worse QOL) CD-QOL scores (42.8 vs. 62.6, $p<0.001$), and higher (i.e., less adaptive eating attitudes/behaviors) CD-FAB scores

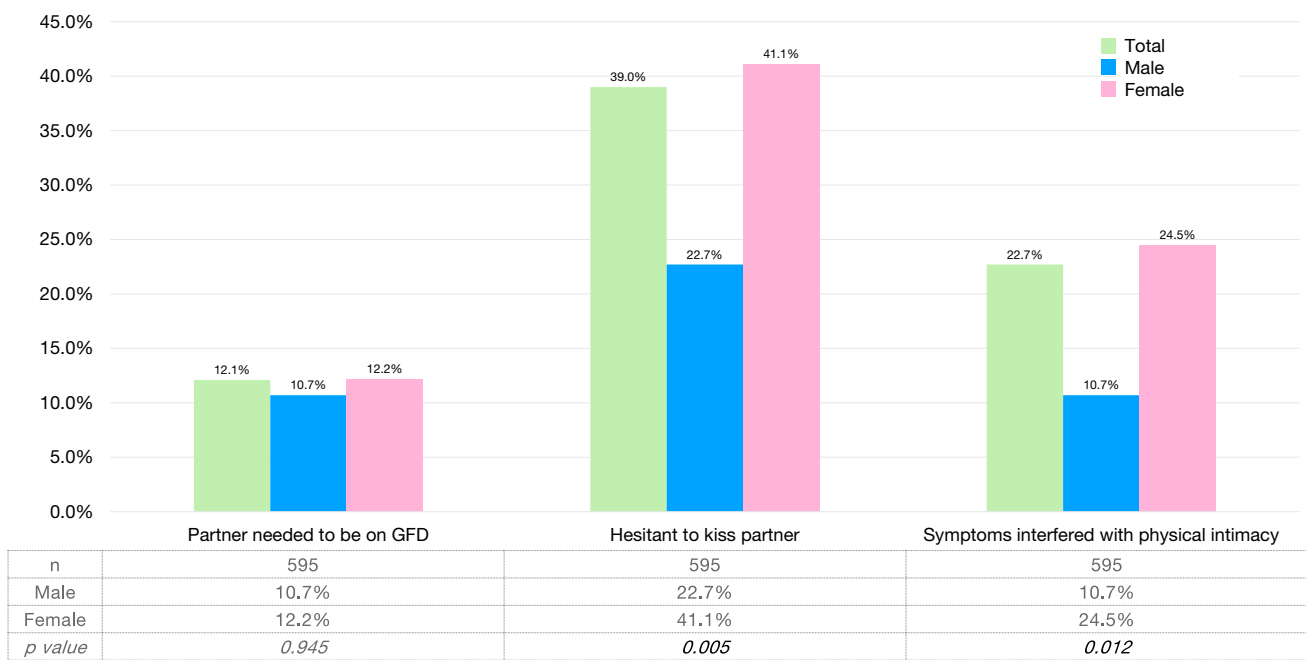


Fig. 3 Impact of CD on partner interactions

(52.5 vs. 40.1, $p = 0.017$) compared to those who reported no interference.

Discussion

In this study, we identified dating-related attitudes and behaviors among individuals with CD. CD appears to have a major impact on dating life. The majority of participants did report a major/moderate impact of CD, versus a minority who reported no major impact. Females, and all persons in the 23–35-year-old age group, felt this impact to a greater degree. The 23–35 age group may be more likely to be actively dating, and therefore to experience such pressures more recently. An annual household income of less than \$50 K was related to this greater impact. Participants who were more hesitant to go on dates, who wanted to be involved in the setting of the date, who brought their own food on a date, who were uncomfortable explaining precautions to waiters in front of their date, and who engaged in riskier eating behaviors on a date were more likely to report a major/moderate impact. Not surprisingly, the greater impact of CD on an individual’s dating life was related to a decreased QOL. A difference of approximately 10 points on the CD-QOL scale is suggestive of clinical significance, and has been shown to be sufficient to move individuals into a worse category of self-rated health, psychological distress, functional status, or pain [8].

These data augment the findings of previous publications. In a study by Lee and colleagues [3], it was found that QOL was significantly negatively impacted in individuals on a GFD. This impact was found to be most strongly associated with the social domain of QOL, in particular dining out, social events, work-related meals, and travel. In a study by Cranney and colleagues [4], among individuals with CD, 81% reported that they no longer dine out, 94% brought their own food when traveling, and 38% avoided travel due to the difficulty of maintaining a GFD. The association between dietary adherence and QOL was investigated by Wolf and colleagues and revealed that higher dietary adherence scores (i.e., more vigorously checked labels, asked many questions when dining out) were associated with lower QOL scores in adults. Participants reported feeling burdened by the restrictive nature of the diet [5]. In the qualitative study by Sverker [6], participants following a GFD reported feeling isolated, constantly thinking about their food, and having concerns over the safety of their food.

In this study, we found that the majority of participants opted for non-food-related activities over meals for the first few dates. A date involving a meal will likely result in an individual sharing their diagnosis. Some individuals may be fearful of discouraging a potential partner before that partner gets to know them. Therefore, they may choose non-food-related activities initially to develop a connection, prior to sharing their diagnosis. For others, CD may be a very important part of their identity that they want a potential partner to know about upfront and will decide to share early

on. In a study of participants with IBS, some felt that social interactions involving food and drink were almost impossible given the risk of bowel disruption and pain. They also noted a fear of rejection and the need to establish a level of rapport and trust before disclosing their condition to a romantic partner [10].

The majority of participants preferred to select or suggest where the date would be held. This speaks to the amount of control someone with CD desires to have over their dating experience. Given the obstacles, they may prefer to have an active role in the process to ensure a higher level of comfort with the situation that ideally fits within their lifestyle. Eating in restaurants, in general, can be anxiety-producing for those with CD, especially since recent evidence has demonstrated that restaurant food, supposedly gluten free, may in fact contain detectable gluten [11]. It would be interesting to see how a non-celiac population would respond to these questions, and how active they prefer to be in this process. Individuals with IBS have been shown to manage their condition by mapping out access to available toilets (toilet-mapping), planning social events, or avoiding them [10].

Although the proportion who intentionally consumed gluten on a date was small, i.e., 7.5%, this is relevant for clinicians, and suggests that individuals may feel less comfortable at restaurants in front of their date, leading to riskier behaviors. These behaviors are important to consider in individuals with elevated serologies and/or ongoing intestinal damage. These results suggest that individuals who are dating may benefit from counseling specific to the social pressures they experience. This also highlights the importance of continuous follow up with a registered dietitian for CD management, as these conversations about QOL issues take time and do not typically occur in a single visit.

Given the challenges of balancing adherence to a GFD while pursuing a romantic relationship, it is expected that participants may find the dating experience with CD less enjoyable. This lack of enjoyment of a process that is almost universally experienced may be a driving factor in a diminished QOL. Individuals who found the experience less enjoyable were also more likely to have less adaptive eating attitudes and behaviors, though this finding was of borderline statistical significance ($p=0.05$).

A subset of individuals felt that their partner needed to also follow a GFD. This is a very unusual requirement for a partner and could limit partner options or potentially cause tension or resentment in a relationship. Remarkably, 39.0% of all survey participants were hesitant to kiss their partner because of CD, despite the lack of evidence supporting or refuting the claim that this may be a clinically relevant source of gluten exposure. The fear of gluten transfer through kissing may be unfounded, as there is no data to inform this theoretical hazard. More studies are needed to quantify the risk of gluten transfer through kissing and the

significance this has on symptom development and intestinal damage.

Moreover, 22.7% of all survey participants felt that their symptoms interfered with being physically intimate. These data allow us to assume that these challenges may go beyond that initial dating experience to influence interactions among partners throughout their relationship. This impact was seen more significantly for females than for males. The reason underlying the difference in views between genders would be interesting to explore. In the study of IBS participants, one woman suggested that bowel habits were something men could joke about, but digestive symptoms were against the social norms of what it means to be a woman [10]. While not addressed in this study, an impact on the partner would not be surprising. In a previous study of partner burden, almost a quarter of partners of those with CD reported moderate-to-low overall relationship satisfaction, and 14% reported moderate-to-low sexual satisfaction. Partner burden was directly correlated with the patient's symptom severity [12]. This previous study, together with our current study, explores how CD can interfere with sexual intimacy and further expands upon the far-reaching manifestations of CD and adherence to a GFD. Similarly, those with IBS noted a barrier whereby intimacy and closeness become difficult, particularly the sharing of space in the bedroom or the bathroom [10].

It appears that perspectives on relationship interactions with CD such as hesitancy to kiss and symptoms that appear to interfere with physical intimacy correlate with increased social anxiety, decreased QOL, and less adaptive eating attitudes and behaviors. The direction of causality of these concerning associated findings is unclear.

This study has several limitations. Participants were recruited via the Celiac Disease Center at Columbia University, a tertiary referral center based in New York City, and may not be representative of the general population of people with CD. The low response rate may limit the generalizability of our findings. At the same time, this questionnaire was sent to a broad audience with the intent of only reaching a relevant subset of this distribution list, i.e., those with CD who have dated. Although these data are significantly biased given the predominance of females, it is similar to the predominance of females among the diagnosed CD population. The female-to-male ratio of CD diagnosis ranges from 2:1 to 3:1 [13]. It is also noted that a majority of participants were college or graduate school educated, had an annual household income of \$100 K or above, and lived in suburban areas. This may likewise limit generalizability. Furthermore, the majority of questions were focused on the active dating experience of pursuing a partner. 67.0% of participants who were asked the dating questions had previously dated and therefore, answered these questions from memory of the past. Only 33.0% were currently dating and answered from current experiences. Given the design of

the survey, participants were asked to complete 4 questionnaires in addition to demographic questions. The length of the survey resulted in 106 only partially completed surveys. Lastly, this survey was distributed during the Covid-19 pandemic, during which dining out was restricted. This very likely hindered active dating at the time and may have influenced recall, as well as SAQ, CD-QOL, and CD-FAB scores. Future studies should interrogate the impact of CD on dating among a wider geographic population, particularly in areas with relatively low access to gluten free dining options.

Conclusion

The majority of participants felt that CD had a major/moderate impact on their dating life. This impact may result in hesitation toward dating and kissing, decreased QOL, greater social anxiety, and less adaptive eating attitudes and behaviors. Dating poses a barrier to the GFD and should be considered in management of CD. The risk of transferring gluten while kissing needs to be explored.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s10620-022-07548-y>.

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Declarations

Conflict of interest Jessica Lebovits, Anne R Lee, Edward J Ciaccio, Randi L Wolf, Rebecca H Davies, Chloe Cerino, and Peter H.R. Green have no conflicts of interest to disclose. Benjamin Lebwohl is a consultant to Takeda and Anokion.

Ethics approval The questionnaire and methodology for this study was approved by the Human Research Ethics committee of Columbia University Medical Center (Protocol #: aAAS9247). This study was approved by the Institutional Review Board at Columbia University

Medical Center. Participants were informed that clicking on the link to the survey and completing it indicated their consent to participate.

Consent to participate Informed consent was obtained from all individual participants included in the study.

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